GENERAL INFORMATION

SERVICE MANUAL

FOREWORD

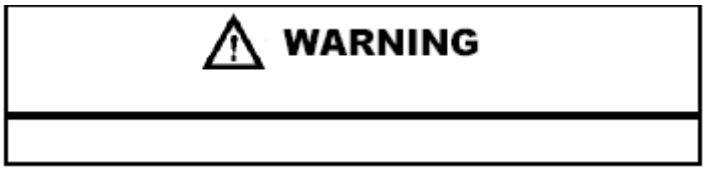
This service manual is designed primarily for use by certified Aeon Master Service Dealer technicians in a properly equipped shop and should be kept available for reference. All references to left and right side of the vehicle are from the operator's perspective when seated in a normal riding position.

Some procedures outlined in this manual require a sound knowledge of mechanical theory, tool use, and shop procedures in order to perform the work safely and correctly. Technicians should read the text and be familiar with service procedures before starting the work. Certain procedures require the use of special tools. Use only the proper tools as specified.

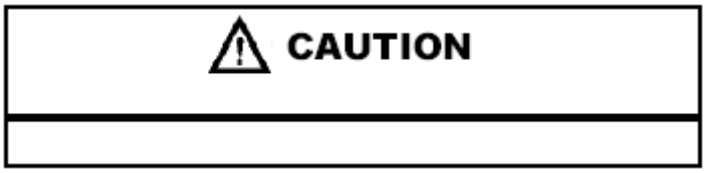
AEON MOTOR
www.aeonmotor.com.tw

GENERAL INFORMATION
UNDERSTANDING MANUAL SAFETY LABELS AND DIRECTIONS

Throughout this manual, important information is brought to your attention by the following symbols:



SAFETY ALERT WARNING indicates a potential hazard that may result in severe injury or death to the operator, bystander or person(s) inspecting or servicing the vehicle.



SAFETY ALERT CAUTION indicates a potential hazard that may result in minor personal injury or damage to the vehicle.

CAUTION indicates special precautions that must be taken to avoid vehicle damage or property damage.

NOTE:

NOTE provides key information by clarifying instructions.

IMPORTANT:

IMPORTANT provides key reminders during disassembly, assembly and inspection of components.

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GENERAL INFORMATION

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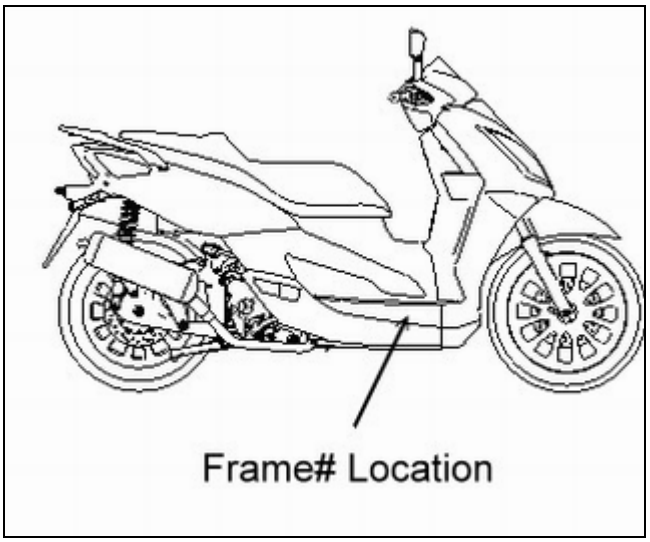
MODEL INFORMATION

VIN IDENTIFICATION

The frame can be found under foot pedal stamped on the right side of frame.

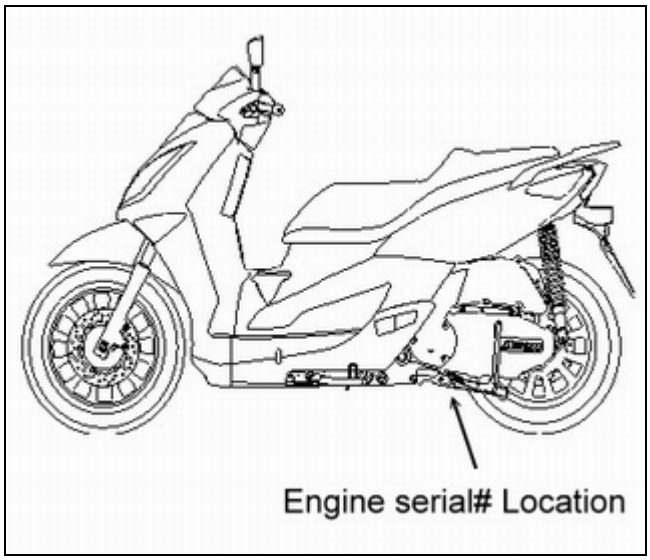
The vehicle identification number (VIN) and engine serial number are important for identification purposes. See the illustrations.

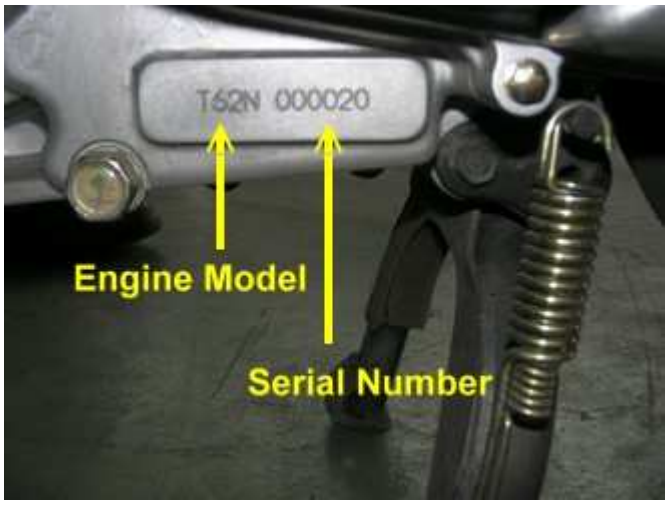
VEHICLE IDENTIFICATION NUMBER LOCATION



ENGINE SERIAL NUMBER LOCATION

Engine serial number local under rear seat stamped on the front of crankcase beneath passenger foot pedal.





URBAN 350 I

Model---AS31-62E

Model number---RF3SA3110AT????????

Engine Model---T62N

GENERAL INFORMATION

SPECIFICATIONS

MODEL: URNAN 350i

ENGINE		DRIVE SYSTEM	
Type	4 Stroke, Single horizontal camshaft	**Gear Box Oil capacity**	200 CC
Displacement	313 CC	**Gear Oil type**	80w90
Cooling	Liquid cooled	**Clutch type**	Dry Centrifugal clutch
Bore and stroke	78 mm *65.6 mm	**Final drive ratio**	40/12*38/13=9.74
Compression ratio	10.4 : 1		
Number of valve	2 Rocker arm activated		
Inlet valve Ø	Ø 33.50mm		
Inlet valve clearance	0.10mm	**CHASSIS**	
Exhaust valve Ø	Ø 30.00mm	**Frame**	Steel
Exhaust valve clearance	0.12mm	**Front suspension**	Telescope forks
Lubrication	Wet sump and pump pressurized	**Front wheel travel**	100mm
Recommended oil	0W/ 40	**Rear suspension**	Swing Arm
Oil capacity	1800 CC	**Rear wheel travel**	135 mm
Starting system	Electric start/ DC, CDI	**Front brake**	Duel disc with single bore caliper
Max. Power	16.5kw/7500rpm	**Rear brake**	Single Disc with single bore caliper
Max. Torque	25Nm/ 4000rpm	**Front tire**	120/70-16, 29psi
FUEL SYSTEM		**Rear tire**	140/70-15, 36psi
Type	Electrical Fuel Injection		
Fuel Delivery	Electronic Fuel Pump		
Fuel Pressure	3 Bar/ 43.5psi	**DIMENSIONS**	
Throttle dimensions	30mm	**Overall length**	2175 mm
Fuel Capacity	13.5 Liter	**Overall width**	840 mm
Idle RPM	1500±100	**Overall height**	1290 mm
		Seat height	800mm
		Wheelbase	1545mm
ENG. ELECTRICAL		**Max. Permissible weight**	200Kg
Charging system	Alternator and voltage regulator	**Number of passenger**	2
Alternator output	168W@4000RPM	**Min. ground clearance**	160mm
Ignition type	TDI	**Dry weight**	175Kg
Spark plug type	NGK/ DPR7EA-9	**Fuel tank capacity**	13.5 Liter
Spark plug gap	0.6~0.7mm	**Max. Speed**	120 km/hr
RPM limiter setting	8500 rpm		
Battery type	GTX10-BS		
Fuse type	Charge 30A/ Main 15A/ Light 10A/ Spare 15A		

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CONVERSION TABLE

Unit of Measure	Multiplied by	Converts to
ft. lbs.	x 12	= in. lbs.
in. lbs.	x .0833	= ft. lbs.
ft. lbs.	x 1.356	= Nm
in. lbs	x .0115	= kg-m
Nm	x .7376	= ft. lbs.
kg-m	x 7.233	= ft. lbs.
kg-m	x 86.796	= in. lbs.
kg-m	x 10	= Nm
in.	x 25.4	= mm
Mm	x .03937	= in.
in.	x 2.54	= cm
mile (mi.)	x 1.6	= km
Km	x .6214	= mile (mi.)
Ounces (oz.)	x 28.35	= Grams (g)
Fluid Ounces (fl. oz.)	x 29.57	= Cubic Centimeters (cc)
Cubic Centimeters (cc)	x .03381	= Fluid Ounces (fl. oz.)
Grams (g)	x 0.035	= Ounces (oz.)
lb.	x .454	= kg
kg	x 2.2046	= lb.
Cubic inches (cu. in)	x 16.387	= Cubic centimeters (cc)
Cubic centimeters (cc)	x 0.061	= Cubic inches (cu. in)
Imperial pints (Imp pt.)	x 0.568	= Liters (l)
Liters (l)	x 1.76	= Imperial pints (Imp pt.)
Imperial quarts (Imp qt.)	x 1.137	= Liters (l)
Liters (l)	x 0.88	= Imperial quarts (Imp qt.)
Imperial quarts (Imp qt.)	x 1.201	= US quarts (US qt.)
US quarts (US qt.)	x 0.833	= Imperial quarts (Imp qt.)
US quarts (US qt.)	x 0.946	= Liters (l)
Liters (l)	x 1.057	= US quarts (US qt.)
US gallons (US gal)	x 3.785	= Liters (l)
Liters (l)	x 0.264	= US gallons (US gal)
Pounds - force per square inch	x 6.895	= Kilopascals (kPa)
Kilopascals (kPa)	x 0.145	= Pounds - force per square inch (psi)
Kilopascals (kPa)	x 0.01	= Kilograms - force per square cm
Kilograms - force per square	x 98.1	= Kilopascals (kPa)
P (3.14)xR2x H (height)		= Cylinder Volume

°C to °F: $\frac{9}{5}$(°C + 32) = °F

°F to °C: $\frac{5}{9}$(°F - 32) = °C

GENERAL INFORMATION

GLOSSARY OF TERMS

ABDC: After bottom dead center.

ACV: Alternating current voltage.

Alternator: Electrical generator producing voltage alternating current.

ATDC: After top dead center.

BBDC: Before bottom dead center.

BDC: Bottom dead center.

BTDC: Before top dead center.

CC: Cubic centimeters.

Center Distance: Distance between center of crankshaft and center of driven clutch shaft.

Chain Pitch: Distance between chain link pins (No. 35 = 3/8" or 1 cm). Polaris measures chain length in number of pitches.

CI: Cubic inches.

Clutch Buttons: Plastic bushings which aid rotation of the movable sheave in the drive and driven clutch.

Clutch Offset: Drive and driven clutches are offset so that drive belt will stay nearly straight as it moves along the clutch face.

Clutch Weights: Three levers in the drive clutch which relative to their weight, profile and engine RPM cause the drive clutch to close and grip the drive belt.

Crankshaft Run-Out: Run-out or "bend" of crankshaft measured with a dial indicator while crankshaft is supported between centers on V blocks or resting in crankcase. Measure at various points especially at PTO.

CVT: Centrifugal Variable Transmission (Drive Clutch System)

DCV: Direct current voltage.

Dial Bore Gauge: A cylinder-measuring instrument, which uses a dial indicator. Good for showing taper and out-of-round in the cylinder bore.

Electrical Open: Open circuit. An electrical circuit which isn't complete.

Electrical Short: Short circuit. An electrical circuit that is completed before the current reaches the intended load. (i.e. a bare wire touching the chassis).

End Seals: Rubber seals at each end of the crankshaft.

Engagement RPM: Engine RPM at which the drive clutch engages to make contact with the drive belt.

ft.: Foot/feet.

Foot Pound: Ft. lb. A force of one pound at the end of a lever one foot in length, applied in a rotational direction.

g: Gram. Unit of weight in the metric system.

gal.: Gallon.

ID: Inside diameter.

in.: Inch/inches.

Inch Pound: In. lb. 12 in. lbs. = 1 ft. lb.

kg/cm2: Kilograms per square centimeter.

kg-m: Kilogram meters.

Kilogram/meter: A force of one kilogram at the end of a lever one meter in length, applied in a rotational direction.

l or ltr: Liter.

lbs/in2: Pounds per square inch.

Left or Right Side: Always referred to based on normal operating position of the driver.

m: Meter/meters.

Mag: Magneto.

Magnetic Induction: As a conductor (coil) is moved through a magnetic field, a voltage will be generated in the windings. Mechanical energy is converted to electrical energy in the stator.

mi.: Mile/miles.

GENERAL INFORMATION

mm: Millimeter. Unit of length in the metric system. 1 mm = approximately .040".

Nm: Newton meters.

OD: Outside diameter.

Ohm: The unit of electrical resistance opposing current flow.

oz.: Ounce/ounces.

Piston Clearance: Total distance between piston and cylinder wall.

psi.: Pounds per square inch.

PTO: Power take off.

qt.: Quart/quarts.

Regulator: Voltage regulator. Regulates battery charging system output at approx. 14.5 DCV as engine RPM increases.

Reservoir Tank: The fill tank in the liquid cooling system.

Resistance: In the mechanical sense, friction or load. In the electrical sense, ohms, resulting in energy conversion to heat.

RPM: Revolutions per minute.

Seized Piston: Galling of the sides of a piston. Usually there is a transfer of aluminum from the piston onto the cylinder wall.

Possible causes: 1) improper lubrication; 2) excessive temperatures; 3) insufficient piston clearance; 4) stuck piston rings.

Stator Plate: The plate mounted under the flywheel supporting the battery charging coils.

TDC: Top dead center. Piston's most outward travel from crankshaft.

Volt: The unit of measure for electrical pressure of electromotive force. Measured by a voltmeter in parallel with the circuit.

Watt: Unit of electrical power. Watts = amperes x volts.

WOT: Wide open throttle.

MAINTENANCE

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PERIODIC MAINTENANCE OVERVIEW

Careful periodic maintenance will help keep your vehicle in the safest, most reliable condition. Inspection, adjustment and lubrication of important components are explained in the periodic maintenance chart.

Inspect, clean, lubricate, adjust and replace parts as necessary. When inspection reveals the need for replacement parts, use genuine Polaris parts available from your dealer.

NOTE: Service and adjustments are critical. If you're not familiar with safe service and adjustment procedures, have qualified dealer perform these operations.

Maintenance intervals in the following chart are based upon average riding conditions and an average vehicle speed of approximately 10 miles per hour. Vehicles subjected to severe use must be inspected and serviced more frequently.

SEVERE USE DEFINITION

- Frequency immersion in mud, water or sand
- Racing or race-style high RPM use
- Prolonged low speed, heavy load operation
- Extended idle
- Short trip cold weather operation

Pay special attention to the oil level. A rise in oil level during cold weather can indicate contaminants collecting in oil sump or crankcase. Change oil immediately if the oil level begins to rise. Monitor the oil level, and if it continues rise, discontinue use and determine the cause or see your dealer.

MAINTENANCE CHART KEY

The following symbols denote potential items to be aware of during maintenance:

■ **Due to the nature of these adjustments, it is recommended this service be performed by authorized AEON dealer.**

◆ **SEVERE USE ITEM: See information provided above.**

⚠ WARNING

Improperly performing the procedures marked with a ■ could result in component failure and lead to serious injury or death. Have an authorized AEON dealer perform these services.

MAINTENANCE

MAINTENANCE INTERVAL

Periodic Maintenance and Lubrication Chart

	ITEM	CHARACTERISTIC	INITIAL	MAINTENANCE INTERVAL					
			500	2000	4000	6000	8000	10000	12000
◆	**Engine oil**	• When the oil change indicator flashes • Check oil level and vehicle for oil leakage.	✓	✓	✓	✓	✓	✓	✓
◆	**Oil pre-filter**	• Replace.	✓		✓		✓		✓
◆	**Transmission oil**	• Check vehicle for oil leakage. • Change.	✓		✓		✓		✓
	Spark plug	• Check condition. • Adjust gap and clean. • Replace every 10000 km.						✓	
■	**Valve clearance**	• Check and adjust valve clearance when engine is cold.	✓					✓	
◆	**Air cleaner**	Replace				✓			✓
◆	**V-belt**	Replace						✓	
■	**EFI**	• Check engine idle speed.	✓		✓		✓		✓
■	**Fuel line**	• Check fuel hoses for crack or damage. • Replace if necessary.				✓			✓
■	**Front brake**	• Check fluid level, and for fluid leakage. • Replace brake pads if necessary.	✓	✓	✓	✓	✓	✓	✓
■	**Rear brake**	• Check fluid level, and for fluid leakage. • Replace brake pads if necessary.	✓	✓	✓	✓	✓	✓	✓
■	**Brake hoses**	• Check for cracks or damage. • Replace brake hose if necessary.	✓	✓	✓	✓	✓	✓	✓
■	**Wheels**	• Check runout and for damage. • Replace if necessary.			✓		✓		✓
■	**Tires**	• Check tread depth and for damage. Replace if necessary. • Check air pressure. Correct if necessary.						✓	
■	**Wheel bearings**	• Check bearings for smooth operation. • Replace if necessary.		✓		✓		✓	
■	**Steering bearings**	• Check bearing assemblies for looseness and apply with grease.	✓	✓	✓	✓	✓	✓	✓
■	**Chassis fasteners**	• Check all chassis fitting and fasteners.	✓	✓	✓	✓	✓	✓	✓
■	**Center stand and Side stand pivots**	• Check operation and apply with grease			✓		✓		✓
■	**Side stand switch**	• Check operation and replace if necessary.	✓		✓		✓		✓
◆	**Front fork**	• Check oil leakage. Replace if necessary.			✓		✓		✓
◆	**Rear shock**	• Check oil leakage. Replace if necessary.			✓		✓		✓
◆	**Cooling system**	• Check coolant level. • Change.			✓		✓		✓
■	**Front and rear brake switches**	• Check operation.	✓	✓	✓	✓	✓	✓	✓
■	**Throttle grip and cable**	• Adjust the throttle cable free play. • Lubricate the throttle grip and cable.			✓		✓		✓
■	**Lights, signals and switches**	• Check operation. • Adjust headlight beam.		✓		✓		✓	

MAINTENANCE

GENERAL VEHICLE INSPECTION AND MAINTENANCE

FRAME, NUTS, BOLTS AND FASTENER INSPECTION

Periodically inspect the torque of all fasteners in accordance with the maintenance schedule. Check that all cotter pins are in place. Refer to specific fastener torques listed in each chapter.

STANDARD TORQUE SPECIFICATIONS

The following torque specifications are to be used as a general guideline. There are exceptions in the steering, suspension, and engine areas. Always consult the exploded views in each manual section when available for torque values of fasteners before using standard torque.

STANDARD FASTENER TORQUES

Thread Size	TORQUE (ft. lbs. / in. lbs.)	TORQUE (Nm)
5 mm bolts and nuts	39-52 in. lbs.	4.5-6 Nm
6 mm bolt and nuts	69-104 in. lbs.	8-12 Nm
8 mm bolts and nuts	13-18 ft. lbs.	18-25 Nm
10 mm bolts and nuts	22-29 ft. lbs.	30-40 Nm
12 mm bolts and nuts	36-43 ft. lbs.	50-60 Nm
4 mm screws	22-30 in. lbs.	2.5-3.4 Nm
5 mm screws	30-43 in. lbs.	3.5-5 Nm
6 mm Hex bolts	87-121 in. lbs.	10-14 Nm
8 mm Hex bolts	17-22 ft. lbs.	24-30 Nm
10 mm Hex bolts	25-32 ft. lbs.	35-45 Nm

MAINTENANCE QUICK REFERENCE

	Item	Lube Rec.	Method	Frequency
1	**Engine oil**	OW-50 Synthetic	Check level or change oil	Check during pre-ride inspection change oil every 2000km reading on odometer.
2	**Transmission**	SAE80W-90 Gear Lubricant	Check level or change lube.	Inspect periodically and change lubrication every 4000km reading on odometer.
3	**Brake fluid**	DOT-4 Brake Fluid	Fill master cylinder reservoir to indicated lever inside reservoir.	As require. Change fluid every 2 years.
5	**Front and rear Suspension**	Premium All Season Grease	Inspect; tighten fasteners; grease zerks.	Every 4000km reading on odometer or 6 months (also after washing scooter or driving in water). More often in severe use

PREPARATION FOR REMOVAL PROCEDURES

1. Remove all dirt, mud, dust and foreign material before removal and disassembly.
2. Use proper tools and cleaning equipment.
3. When disassembling the vehicle, always keep mated parts together. This includes gears, cylinder, piston and other parts that have been “mated” through normal wear.

Mated parts must always be reused or replaced as an assembly.

4. During vehicle disassembly, clean all parts and place them in trays in the order of disassembly.

This will speed up assembly and allow for the correct installation of all parts.

5. Keep all parts away from any source of fire.

REPLACEMENT PARTS

Use only genuine AEON parts for all replacements. Use oil and grease recommended by service manual for all lubrication jobs.

GASKETS, OIL SEALS AND O-RINGS

1. Replace all gaskets, seals and O-rings when overhauling the engine. All gasket surfaces, oil seal lips and O-rings must be cleaned.
2. Properly oil all mating parts and bearings during reassembly. Apply grease to the oil seal lips.

FUEL SYSTEM

⚠ WARNING

Gasoline is extremely flammable and explosive under certain conditions.

Always stop the engine and refuel outdoors or in a well-ventilated area.

Do not smoke or allow open flames or sparks in or near the area where refueling is performed or where gasoline is stored.

Do not overfill the tank. Do not fill the tank neck.

If you get gasoline in your eyes or if you swallow gasoline, seek medical attention immediately.

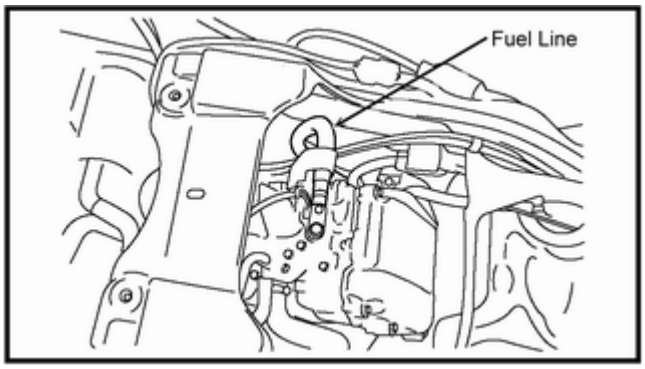
If you spill gasoline on your skin or clothing, immediately wash it off with soap and water and change clothing.

Never start the engine or let it run in an enclosed area. Engine exhaust fumes are poisonous and can result loss of consciousness or death in a short time.

Never drain the fuel when the engine is hot. Severe burns may result.

FUEL LINE

1. Check the connect fuel line for signs of wear, deterioration, damage or leakage. Replace if necessary.



2. Be sure fuel line is routed properly.

IMPORTANT: Make sure line is not kinked or pinched.

3. Replace fuel line every two years.

MAINTENANCE

FUEL PUMP / FUEL FILTERS / PUMP REGULATOR

The 350 EFI engine uses a non-serviceable, high-volume, high-pressure, fuel pump system that includes a filter and a pump regulator.

NOTE: For all other information related to the EFI System, refer to Chapter 6.

VENT LINES

1. Check fuel tank, front gear case, rear gear case and transmission vent lines for signs of wear, deterioration, damage or leakage. Replace every two years.
2. Be sure vent lines are routed properly and secured with cable ties.

IMPORTANT: Ensure lines are not kinked or pinched.

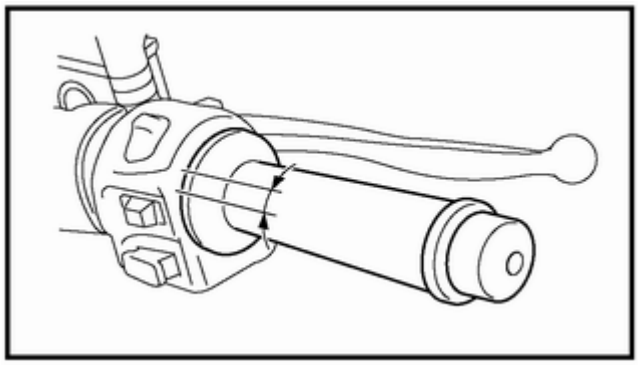
THROTTLE INSPECTION

If the throttle has excessive play due to cable stretch or cable maladjustment, it will cause a delay in throttle speed.
Also, the throttle may not open fully. If the throttle has no play, the throttle may be hard to control, and the idle speed may be erratic.
Check the throttle pedal play periodically in accordance with the Periodic Maintenance Chart and adjust the play if necessary.

THROTTLE FREE PLAY ADJUSTMENT

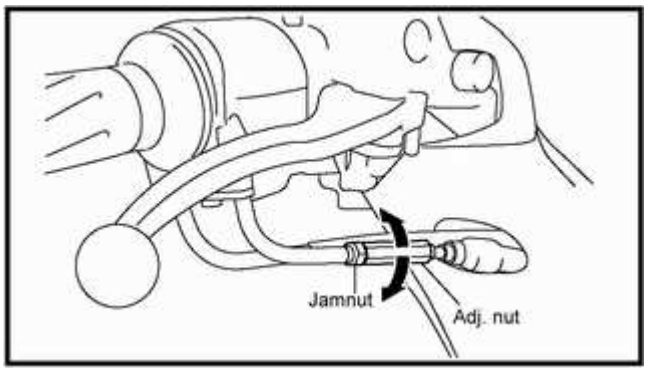
Inspection

1. Start the engine, and warm it up thoroughly.
2. Measure the distance the throttle pedal moves before the engine begins to pick up speed. Free play should be 3 - 5 mm.



Adjustment

1. Squeeze the end of the rubber boot and slide it far enough to expose the end of the inline cable adjuster.
2. Loosen the adjuster lock nut.
3. Rotate the boot to turn the adjuster until 3-5 mm of freeplay is achieved at the throttle pedal.



NOTE: While adjusting, lightly pull the throttle lever.

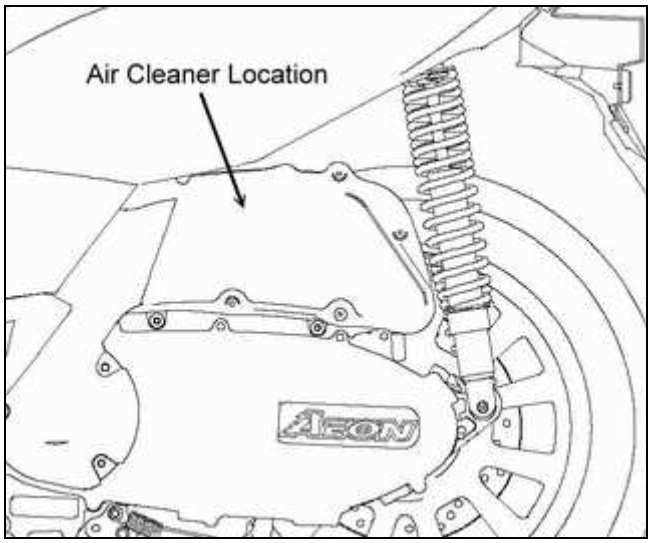
4. Tighten the lock nut.
5. Squeeze the end of the rubber boot and slide it over the cable adjuster to its original position.

WARNING

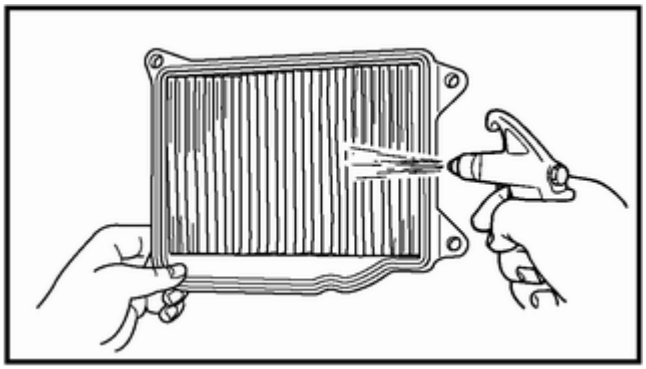
After adjusting the throttle cable free play, start the engine and turn the handlebars to the right and to the left to ensure that this does not cause the engine idling speed to change.

AIR CLEANER SERVICE

1. The air cleaner is located just above the rear wheel in the left of vehicle.



NOTE: It is recommended that the air filter be inspected as part of pre-ride inspection. When riding in extremely dusty conditions, air filter replacement will be required more often.



2. Remove all screw and remove the air box cover. Inspect the seal. It should adhere tightly to the cover and seal all the way around.

3. Remove air filter assembly. Blow by compressed air to filter outer surface.

4. Inspect the air filter element and replace if necessary.

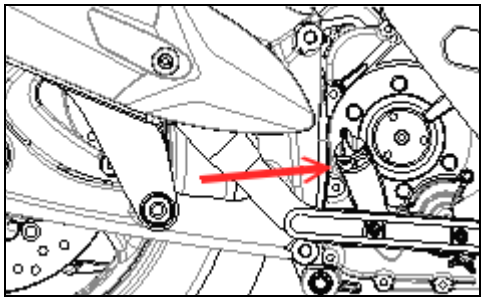
ENGINE OIL LEVEL

The horizontal cylinder engine is a wet-sump engine, meaning the oil is contained in the bottom of the crankcase. To check the oil level follows the procedure listed below.

1. Position vehicle on a level surface.

2. Be sure the machine has sat for a while before removing the dipstick.

IMPORTANT: Do not run the machine and then check the dipstick.

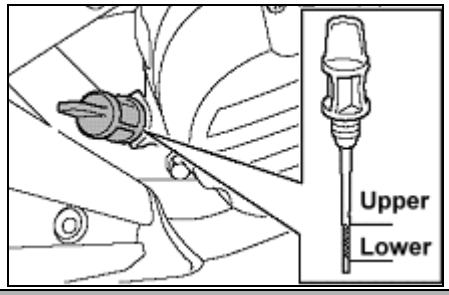


3. Remove dipstick and wipe dry with a clean cloth.

4. Reinstall the dipstick completely and screw it to the end.

NOTE: Make certain the dipstick is inserted all the way into the filler tube to keep the angle and depth of dipstick consistent.

7. Remove the dipstick and check the oil level. Maintain the oil level between the" Upper and Lower" range. Add oil as indicated by the level on the dipstick. Do not overfill (see NOTE below).



Crankcase Drain Plug Torque:

20 Nm (15 ft. lbs.)

Oil Filter Torque:

5 Nm (45 in. lbs.)

MAINTENANCE

NOTE: A rising oil level between checks in cool weather driving can indicate contaminants such as gas or moisture collecting in the crankcase. If the oil level is over the full mark, change the oil immediately.

8. Reinstall the dipstick and seat the lever lock.

ENGINE OIL AND FILTER SERVICE

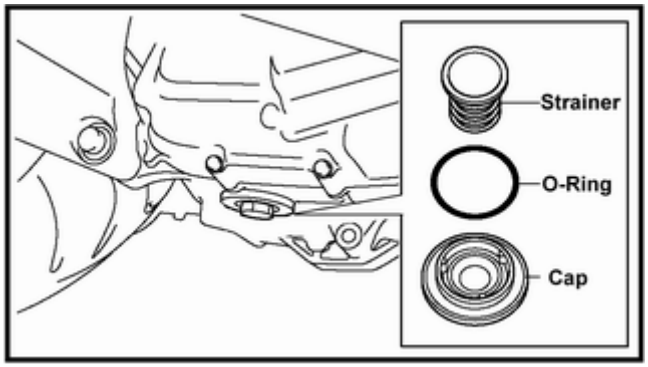
Always change engine oil and filter at the intervals outlined in the Periodic Maintenance Chart. Always change the oil filter whenever changing the engine oil.

⚠ WARNING

Personal injury can occur when handling used oil. Hot oil can cause burns or skin damage.

Recommended Engine Oil:
Synthetic SAE 0W-40 Above 0°C (32°F)
Semi-Synthetic SAE 20W-40 Below 0°C (32°F)

1. Position vehicle on a level surface.
2. Clean area around oil drain plug at bottom of engine.



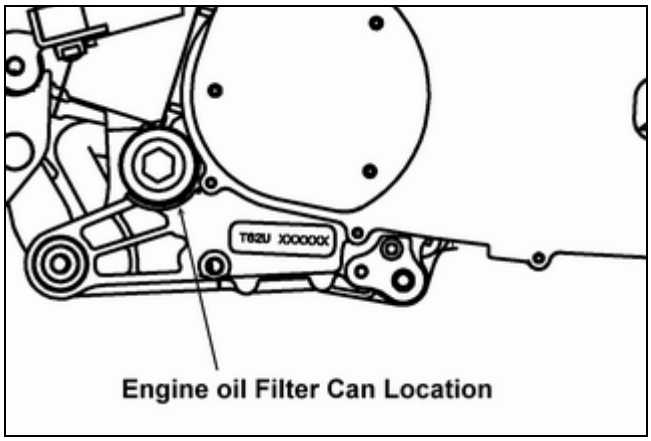
CAUTION

Hot oil can cause serious burns to skin. Do not allow hot oil to come in contact with skin.

3. Place a drain pan beneath engine crankcase and remove the drain plug.
4. Allow oil to drain completely.
5. Replace the sealing washer on drain cap.

NOTE: The sealing surface on the drain plug should be clean and free of burrs, nicks or scratches.

6. Reinstall drain plug and torque to **20 Nm (15 ft. lbs.)**.
7. Place shop towels beneath oil filter. Using Oil Filter Wrench, turn the oil filter counter-clockwise to remove it.
8. Using a clean dry cloth, clean filter sealing surface on the crankcase.
9. Lubricate O-ring on new filter can with a film of fresh engine oil. Check to make sure the O-ring is in good condition.

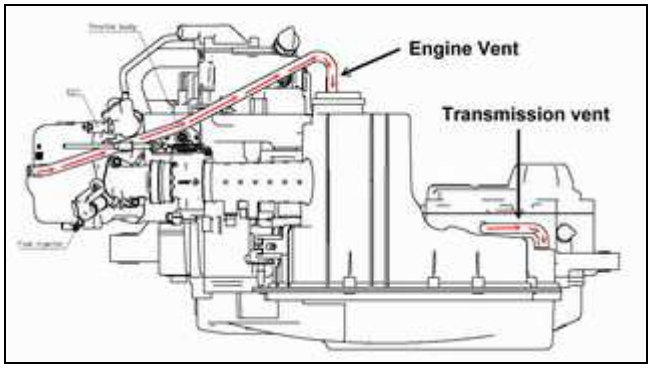


Engine oil Filter Can Location

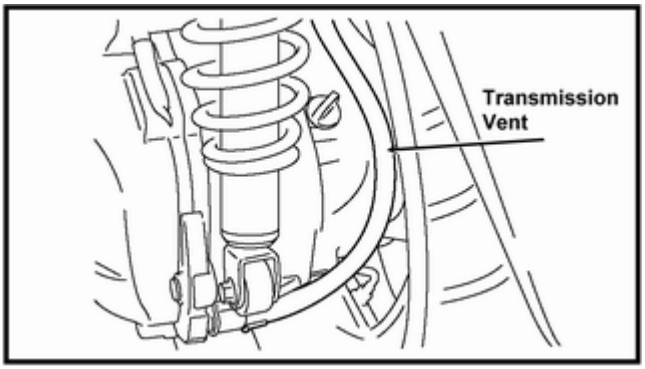
10. Install new filter can and turn by hand until filter gasket contacts the sealing surface then turn an additional 1/2 turn.
11. Remove dipstick and fill sump with 1800cc 0W-40 synthetic oil.
8. Start the engine and let it idle for one to two minutes.
12. Stop the engine and inspect for leaks.
13. Re-check the oil level on the dipstick and add oil as necessary to bring the level to the upper mark on the dipstick.
14. Dispose of used oil and oil filter properly.

ENGINE BREATHER HOSE INSPECTION

The engine is equipped with a breather hose. Inspect the breather hose for possible kinks or wear. The hose is form fitted for a proper fit. Follow the breather hose from the side of the air cleaner to the engine valve cover.

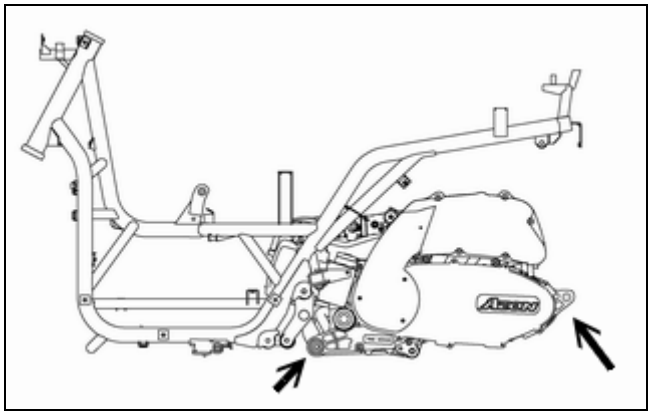


NOTE: Make sure line is not kinked or pinched.



ENGINE MOUNT LOCATIONS

Periodically inspect engine and transmission mounts for cracks or damage.



TRANSMISSION LUBRICATION

NOTE: It is important to follow the transmission and gear case maintenance intervals described in the Periodic Maintenance Chart. Regular fluid level inspections on these components should be performed as well.

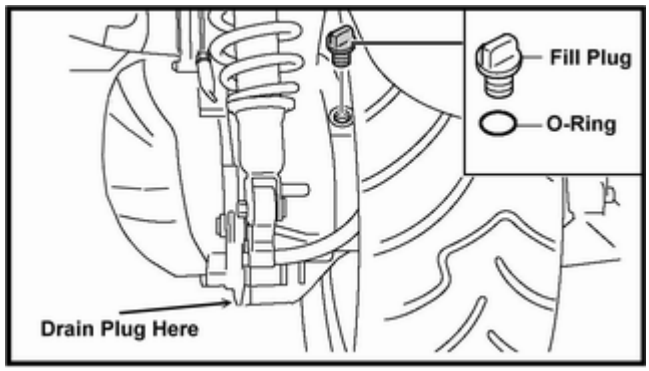
Transmission Specifications
Specified Lubricant:
Gear case Lubricant: SAE 80W-90
Approximate Capacity at Change: 200ml
Drain Plug Torque: 60 Nm (44 ft. lbs.)
Fill Plug Torque: 5 Nm (45 in. lbs.)

The transmission lubricant levels should be checked and changed in accordance with the maintenance schedule.

1. Be sure vehicle is positioned on a level surface when checking or changing fluid.
2. Check vent hose to be sure it is routed properly and unobstructed.

TRANSMISSION LUBRICANT CHANGE：

1. Remove the fill plug.



2. Place a drain pan under the main drain plug.
3. Remove the drain plug and allow draining completely.
4. Clean the drain plug.
5. Reinstall the drain plug with a new o-ring and torque to **60 Nm (44 ft. lbs.)**.
6. Add the recommended fluid through the fill plughole. Maintain the fluid level at the bottom of the fill plughole when filling the gear oil. Do not overfill.
7. Reinstall the fill plug and torque to **5 Nm (45 in-lbs.)**.
8. Check for leaks. Discard the used lubricant properly.
9. Reinstall the filler.
10. Start the engine. Allow it to idle for one to two minutes.
11. Stop the engine and inspect for leaks.

COOLING SYSTEM OVERVIEW

The engine coolant level is controlled, or maintained, by the recovery system. The recovery system components are the recovery bottle, radiator filler neck, radiator pressure cap and connecting hose.

As coolant-operating temperature increases, the expanding (heated) excess coolant is forced out of the radiator past the pressure cap and into the recovery bottle. As engine coolant temperature decreases the contracting (cooled) coolant is drawn back up from the tank past the pressure cap and into the radiator.

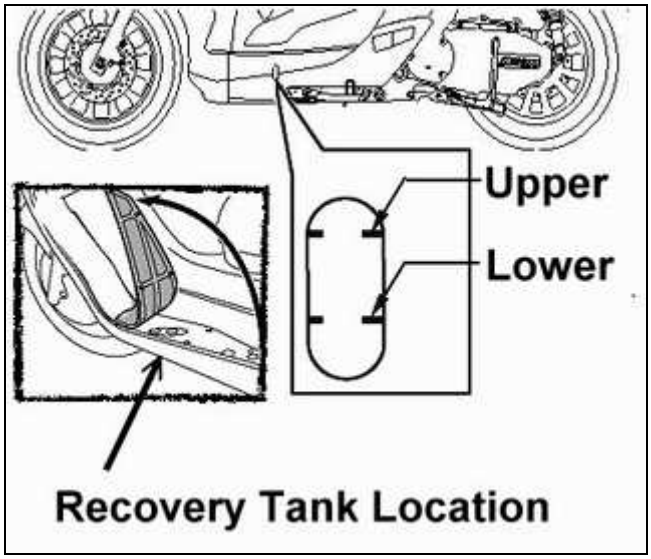
NOTE: Some coolant level drop on new machines is normal as the system is purging itself of trapped air. Observe coolant levels often during the break-in period.

NOTE: Overheating of engine could occur if air is not fully purged from system.

Coolant 50/50 is already premixed and ready to use. Do not dilute with water.

COOLANT LEVEL INSPECTION

The pressure cap and recovery tank are located under the left floor of the vehicle. The coolant level must be maintained between the minimum and maximum levels indicated on the recovery tank.



With the engine at operating temperature, the coolant level should be between the upper and lower marks on the coolant recovery bottle. If not, perform the following procedure.

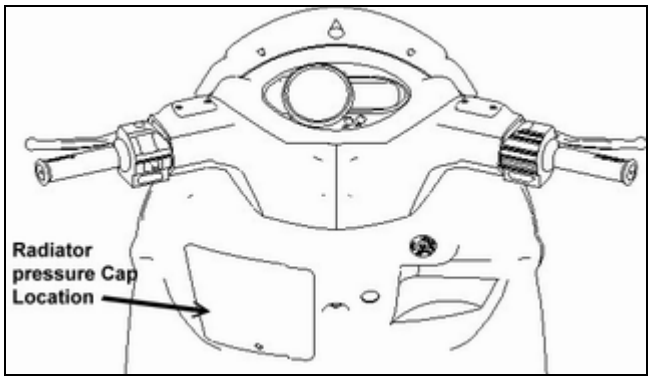
1. Position the vehicle on a level surface.
2. Remove the rubber mat from the left floor.
3. View the coolant level in the recovery bottle.
4. If the coolant level is below the MIN line, inspect the coolant level in the radiator.

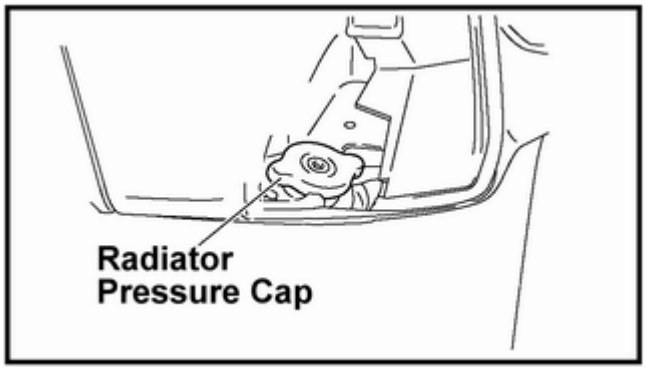
NOTE: If overheating is evident, allow system to cool completely and check coolant level in the radiator and inspect for signs of trapped air in system.

⚠ WARNING

Never remove the pressure cap when the engine is warm or hot. Escaping steam can cause severe burns. The engine must be cool before removing the pressure cap.

5. Remove the inspection cover from the cab.
6. Remove the pressure cap. Using a funnel, add coolant to the top of the filler neck.
7. Reinstall the pressure cap.





MAINTENANCE

NOTE: Use of a non-standard pressure cap will not allow the recovery system to function properly.

8. Remove recovery bottle cap and add coolant using a funnel.

9. Fill recovery bottle to MAX level with Anti Freeze/Coolant or 50/50 or 60/40 mixtures of antifreeze and distilled water as required for freeze protection in your area.

10. Reinstall the recovery bottle cap.

11. If coolant was required, start engine and check for leaks. Make sure radiator fins are clean to prevent overheating.

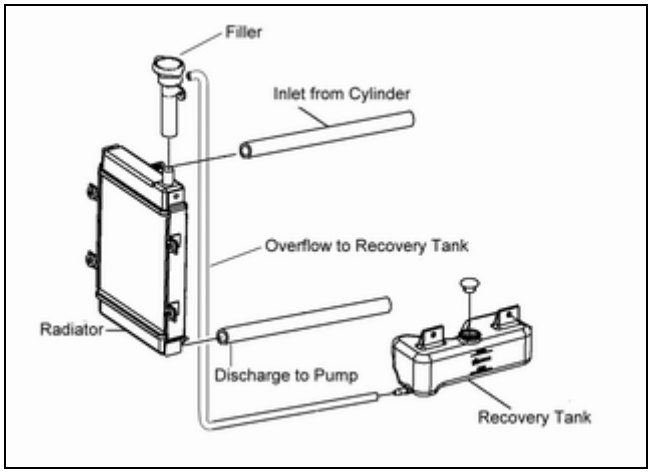
COOLANT STRENGTH / TYPE

1. A 50/50 or 60/40 mixture of antifreeze and distilled water will provide the optimum cooling, corrosion protection, and antifreeze protection.

2. Straight water or antifreeze may cause the system to freeze, corrode, or overheat.

COOLING SYSTEM HOSES

1. Inspect all hoses for cracks, deterioration, abrasion or leaks. Replace if necessary.



2. Check tightness of all hose clamps.

⚠ CAUTION

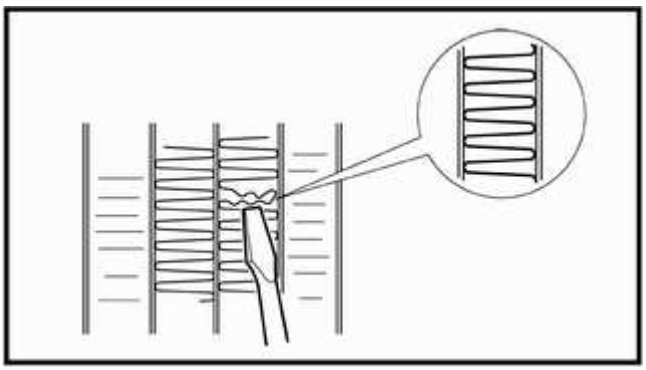
Do not over-tighten hose clamps at radiator, or radiator fitting may distort, causing a restriction to coolant flow. Radiator hose clamp torque is 4 Nm (36 in. lbs.).

RADIATOR

1. Check radiator air passages for restrictions or damage.

2. Carefully straighten any bent radiator fins.

3. Remove any obstructions with compressed air or low-pressure water.



⚠ CAUTION

Washing the vehicle with a high-pressure washer could damage the radiator fins and impair the radiators effectiveness. Use of a high-pressure washer is not recommended.

COOLANT DRAIN

1. Remove front windshield and floor.

2. Slowly remove the pressure cap to relieve any cooling system pressure.

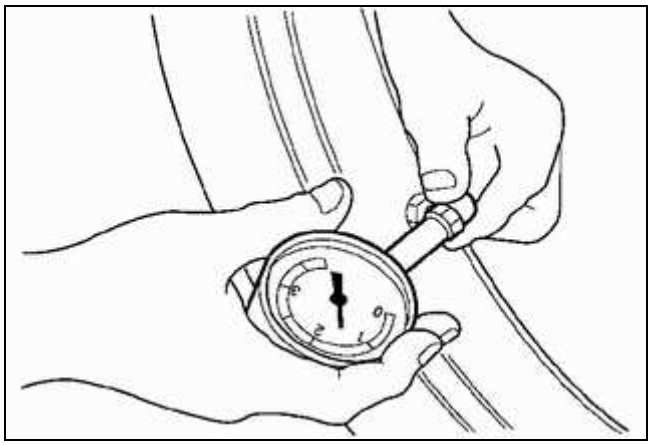
3. Place a suitable drain pan underneath the discharge hose on the LH side of the radiator.

4. Drain the coolant from the radiator by removing the lower engine inlet hose from the Radiator discharge hose. Properly dispose of the coolant.

5. Allow coolant to completely drain.

TIRE PRESSURE MEASUREMENT

1. Position the vehicle on a level surface. Use the center stand.
2. Measure tires pressure by gauge and corrected it.



⚠ CAUTION

• The tire pressure should only be checked and regulated when the tire temperature equals the ambient air temperature.
• The tire pressure and the suspension must be adjusted according to the total weight (including cargo, rider, passenger and accessories) and the anticipated riding speed.

⚠ WARNING

• Operation of an overloaded scooter could cause tire damage, an accident or an injury.
• NEVER OVERLOAD THE SCOOTER.

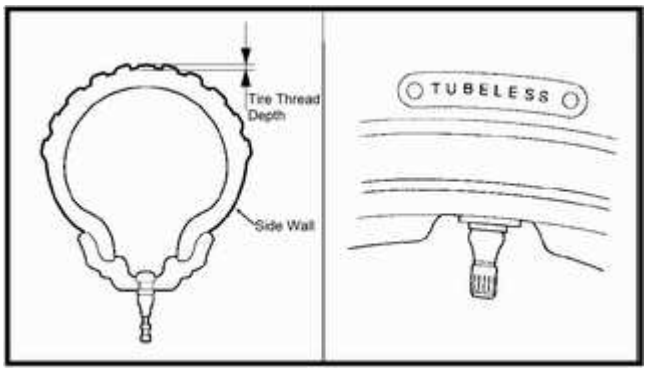
Dry weight (Incl. Oil & Fuel)	170 kg
Max Load	200kg
Front tire	
Max. Load	230kg/ 584lb.
Tire pressure	210kap/ 30psi.
Max tire pressure	280kpa/ 33psi.
Rear tire	
Max. Load	325kg/ 716lb.
Tire pressure	252kpa/ 36psi.
Max tire pressure	280kpa/ 40psi

WEAR INDICATOR

⚠ WARNING

It is dangerous to ride with a worn-out tire. When the tire tread reaches the wear limit, replace the tire immediately.

1. Inspect tire thread depth and side wall surface condition. If reach worn limit, replace it immediately.



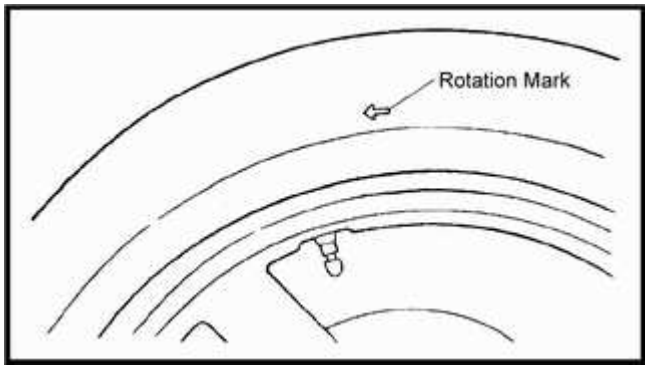
Note: Patching a punctured tire is not recommended. If tire were patched, replace it.

2. When replacing a tire always use original equipment size and type.

⚠ CAUTION

New tires have a relatively low grip on the road surface until they have been slightly worn. Therefore, approximately 100 km should be traveled at normal speed before any high-speed riding is done.

There is a direction of rotation mark on tire surface. Install the tire with the mark pointing in the direction of wheel rotation.

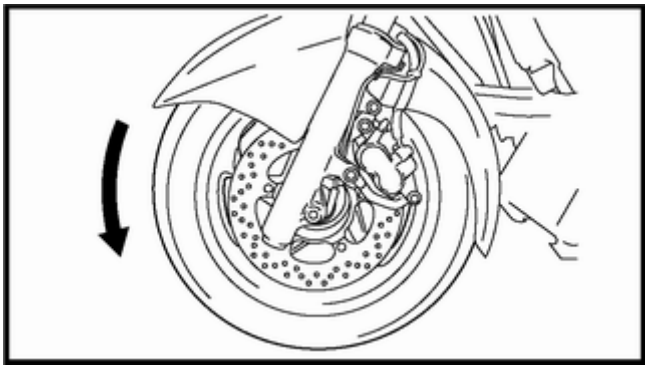


CHECK WHEEL

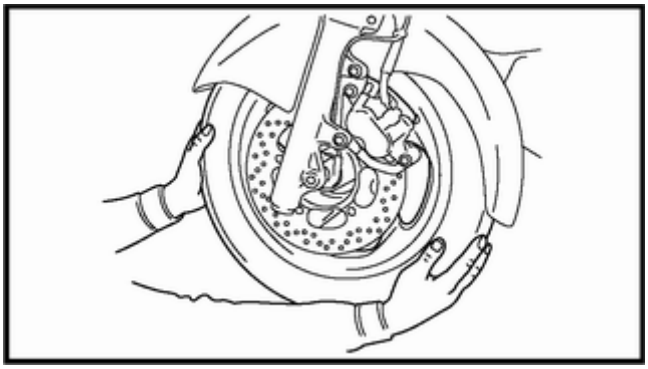
1. Elevate the appropriate side of the vehicle by placing a suitable stand under the frame.

⚠ WARNING

Serious injury may result if machine tips or falls. Be sure machine is secure before beginning this service procedure.



2. Check both wheels damaged or out of round. If wheel damaged or out of round, replace it.



After a tire or wheel has been changed or replaced, always balance the wheel.

BATTERY MAINTENANCE

Keep battery terminals and connections free of corrosion. If cleaning is necessary, remove the corrosion with a stiff wire brush. Wash with a solution of one-tablespoon baking soda and one cup water. Rinse well with tap water and dry off with clean shop towels. Coat the terminals with dielectric grease or petroleum jelly.

Be careful not to allow cleaning solution or tap water into the battery

⚠ WARNING

Battery electrolyte is poisonous. It contains sulfuric acid. Serious burns can result from contact with skin, eyes or clothing. Antidote:

External: Flush with water.

Internal: Drink large quantities of water or milk. Follow with milk of magnesia, beaten egg, or vegetable oil. Call physician immediately.

Eyes: Flush with water for 15 minutes and get prompt medical attention.

Batteries produce explosive gases.

Keep sparks, flame, cigarettes, etc. away.

Ventilate when charging or using in an enclosed space.

Always shield eyes when working near batteries.

KEEP OUT OF REACH OF CHILDREN.

NOTE: Battery must be fully charged before use or battery life will be reduced for 10-30% of full potential. Charge battery for 3-5 hours at a current equivalent of 1/10 of the battery rated amp/hour capacity. Do not use the alternator to charge a new battery.

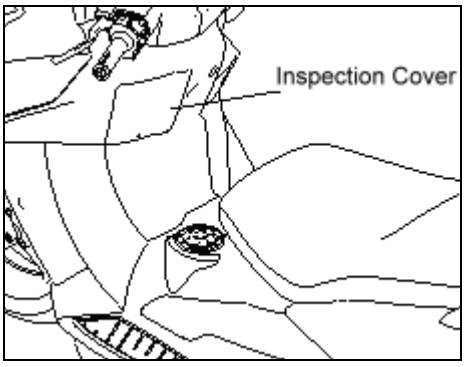
⚠ CAUTION

To reduce the chance of sparks: Whenever removing the battery, disconnect the black (negative) cable first. When reinstalling the battery, install the black (negative) cable last.

MAINTENANCE

BATTERY REMOVAL

1. Remove the inspection panel to access the battery.



2. Disconnect the black (negative) battery cable.

3. Disconnect the red (positive) battery cable.

4. Remove the clamp bracket and slide the battery out of the scooter.

BATTERY INSTALLATION

IMPORTANT: Using a new battery that has not been fully charged can damage the battery and result in a shorter life. It can also hinder vehicle performance.

Follow the battery charging procedure before installing the battery.

1. Ensure the battery is fully charged.

2. Place the battery in the battery holder and secure with clamp bracket.

3. Coat the terminals with dielectric grease or petroleum jelly.

4. Connect and tighten the red (positive) cable first.

5. Connect and tighten the black (negative) cable last.

6. Verify that cables are properly routed and reinstall..

BATTERY OFF SEASON STORAGE

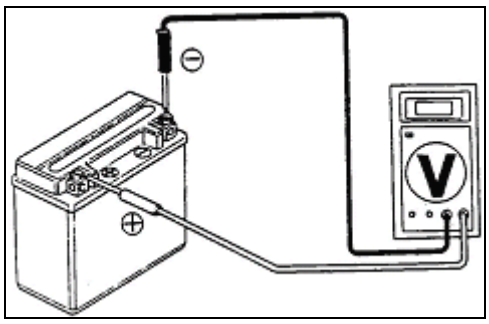
Whenever the vehicle is not used for a period of three months or more, remove the battery from the vehicle, ensure that it's fully charged, and store it out of the sun in a cool, dry place. Check battery voltage each month during storage and recharge as needed to maintain a full charge.

NOTE: Battery charge can be maintained by using a battery charger or by charging about once a month to make up for normal self-discharge.

Battery tenders can be left connected during the storage period, and will automatically charge the battery if the voltage drops below a pre-determined point.

The single most important thing about maintaining a sealed battery is to keep it fully charged. Since the battery is sealed and the sealing strip cannot be removed, you must use a voltmeter or multi-meter to measure the DC voltage at the battery terminals.

1. Check the battery voltage with a voltmeter or multi-meter. The battery voltage should read 12.8 VDC or higher.



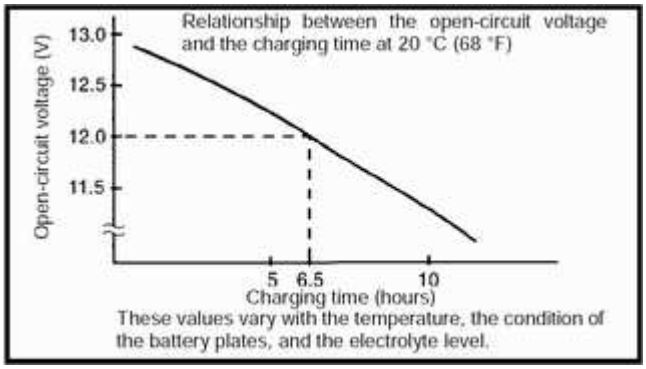
2. If the voltage is less than 12.8 volts, charge the battery at 1.2 amps or less until battery voltage is 12.8 VDC or greater.

NOTE: When using an automatic charger, refer to the charger manufacturer's instructions for battery charging directions. When using a constant current charger, follow the guidelines in the following table:

Note:

Fully charged: over 12.8 V

Failure charged: under 12.5 V



SPARK PLUG SERVICE

1. Remove seat and storage box.

⚠ WARNING

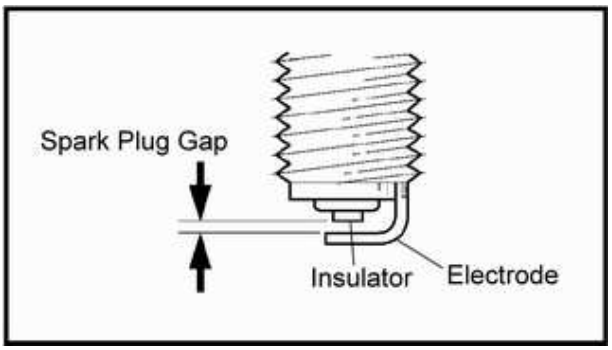
A hot exhaust system and engine can cause serious burns. Allow engine to cool or wear protective gloves when removing the spark plugs

2. Remove both spark plug caps.

3 Clean plug area so no dirt and debris can fall into engine when plugs are removed.

4. Remove spark plugs.

5. Inspect electrodes for wear and carbon buildup. Look for a sharp outer edge with no rounding or erosion of the electrodes.



6. Clean with electrical contact cleaner or a glass bead spark plug cleaner only. **CAUTION:** A wire brush or coated abrasive should not be used.

7. Measure gap with a wire gauge. Refer to specifications in the following illustration for proper spark plug type and gap. Adjust gap if necessary by carefully bending the side electrode.

8. If necessary, replace spark plug with proper type.

CAUTION: Severe engine damage may occur if the incorrect spark plug is used.

9. Apply anti-seize compound to the spark plug threads.

10. Install spark plug and torque to specification.

Recommended Spark Plug:
NGK DPR7EA-9
Spark Plug Gap:
0.7~09.mm

STEERING AND SUSPENSION

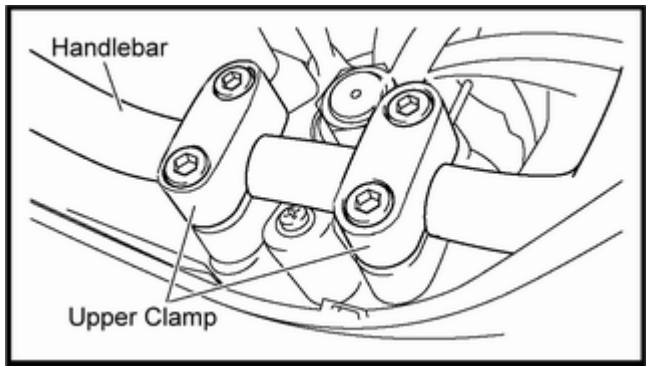
The steering components should be checked periodically for loose fasteners and damage.

Replace any worn or damaged steering components. Steering should move freely through the entire range of travel without binding. Check routing of all cables, hoses, and wiring to be sure the steering mechanism is not restricted or limited.

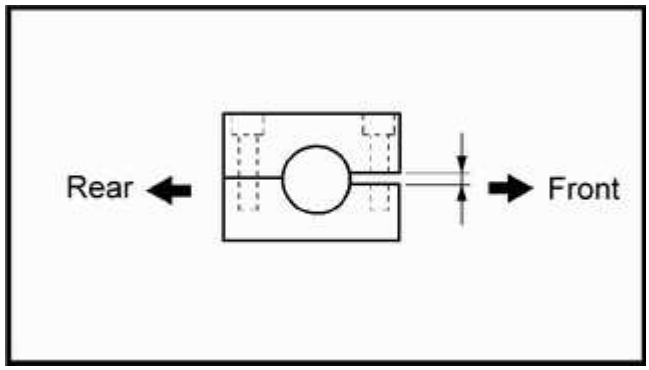
HANDLE BAR INSPECTION

1. Remove handlebar pod.

2. Check handlebar clamp



3.The upper handlebar holders should be installed with facing forward.



STEERING HEAD INSPECTION

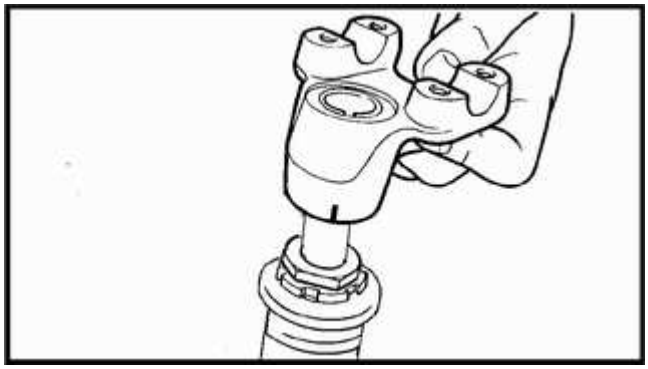
1. Position the scooter on level ground.

2. Lightly turn the handlebar left and right.

3. There should be without any free play.

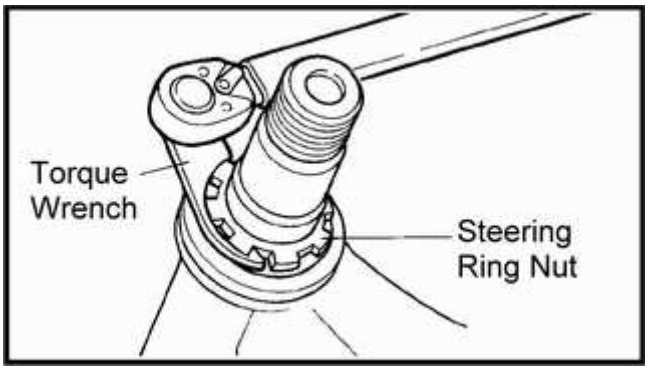
4. If there is excessive free play or the steering feels rough, inspect the steering head.

5. Remove handlebar lower clamp away.



6. Remove upper lock ring nut.

7. Loosen the lower steering ring nut and then tighten it to specification with the steering nut wrench.



Steering Ring nut specification torque:
36 Nm (3.6 m · kg, 25 ft · lb)
Then LOOSEN the lower steering ring nut 1/4 turn.

8. Tighten the upper lock ring nut to 90Nm.

9. Ensure can lightly turn the handlebar left and right to end.

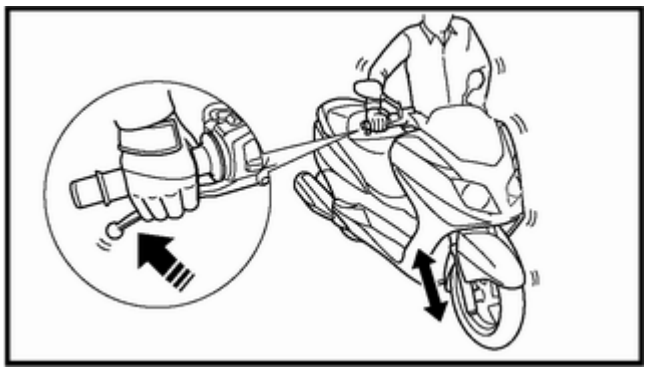
⚠ WARNING

Do not over tighten the lower steering ring nut.

FRONT FORK

1. Stand the scooter on a level surface.

2. Inspect front fork inner tube damage, crack or oil leakage at oil seal. If necessary, replace it.



3. Hold the scooter upright and apply the front brake. Push down hard on the handlebar several times and check if the front fork rebounds smoothly.

4. If front fork rough movement, repair or replace it.

REAR SHOCK PRELOAD ADJUSTMENT

The rear shock absorber springs are adjustable by rotating the adjustment cam to change spring tension preload.

Suspension Spring Adjustment

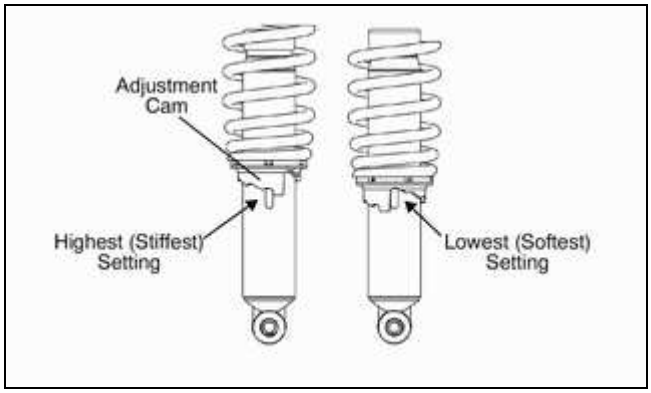
1. Position the scooter on a level surface.

2. Stop the engine.

3. Raise and safely support the rear of the scooter off the ground to allow the suspension to fully extend.

NOTE: The tires should not be touching the ground.

4. To adjust the suspension, use the adjustment cam located near the bottom of the shock.



5. Rotate the adjustment cam clockwise to increase spring tension or counter-clockwise to decrease spring tension.

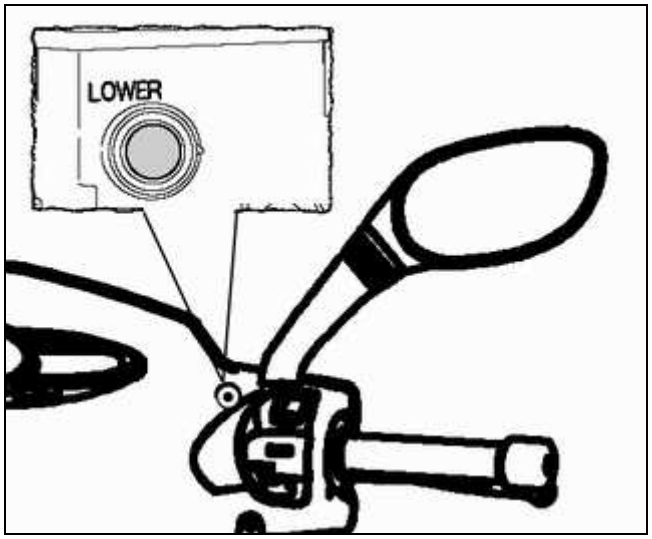
6. Each notch of the adjustment will add 6% - 8% more preload to the spring over the primary position.

BRAKE FLUID INSPECTION

Always check the brake lever travel and inspect the brake fluid reservoir level before each operation. If the fluid level is low, add DOT 4 brake fluid only.

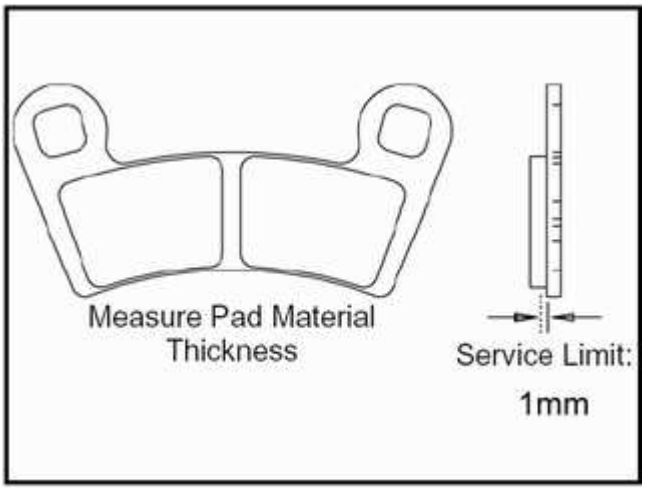
Brake fluid should be changed every two years. The fluid should also be changed anytime the fluid becomes contaminated, the fluid level is below the minimum level, or if the type and brand of the fluid in the reservoir is unknown.

1. Position the scooter on a level surface.
2. View the brake fluid level in the reservoir. The level should be between the MAX and MIN level lines.
4. If the fluid level is lower than the MIN level line, add brake fluid until it reaches the MAX level line.
5. Install the reservoir cap and apply the brake lever forcefully for a few seconds and check for fluid leakage around the master cylinder fittings and the brake caliper fittings.



BRAKE PAD / DISC INSPECTION

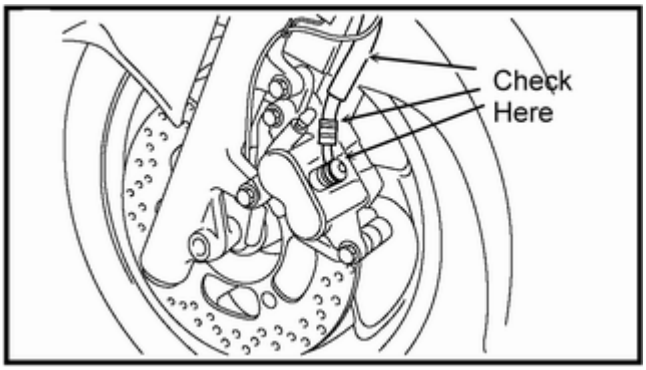
1. Check the brake pads for wear, damage, or looseness.
2. Inspect the brake pad wear surface for excessive wear.
3. Pads should be changed when the friction material is worn to 1 mm.



4. Check surface condition of the brake discs.
5. Measure the thickness of the front and rear brake discs.
6. The disc(s) should be replaced if thickness is less than 4mm rear disc and 3.5mm front disc.

BRAKE HOSE AND FITTING INSPECTION

Check brake system hoses and fittings for cracks, deterioration, abrasion, and leaks. Tighten any loose fittings and replace any worn or damaged parts.



CVT SYSTEM

CHAPTER 3

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CVT MAINTENANCE / INSPECTION 3-2

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CVT SYSTEM OVERVIEW

⚠ WARNING

Only a certified Aeon Service Dealer technician who has received the proper training and understands the procedures outlined in this manual should perform all CVT maintenance or repairs. Because of the critical nature and precision balance incorporated into the CVT components, it is absolutely essential that no disassembly or repair be made without factory authorized special tools and service procedures.

The Continuously Variable Transmission (CVT) consists of three major assemblies:

1) The Drive Clutch
2) The Driven Clutch
3) The Drive Belt.

The internal components of the drive clutch and driven clutch control engagement (initial vehicle movement), clutch up shift and backshift. During the development of an Aeon ATV, the CVT system is matched first to the engine power curve; then to average riding conditions and the vehicle's intended usage. Therefore, modifications or variations of components at random are never recommended. Proper clutch setup and careful inspection of existing components must be the primary objective when troubleshooting and tuning.

CVT MAINTENANCE / INSPECTION

Under normal operation the CVT system will provide years of trouble free operation. Periodic inspection and maintenance is required to keep the system operating at peak performance. The following list of items should be inspected and maintained to ensure maximum performance and service life of CVT components. See "CVT Overheating / Diagnosis" on page 3.4 for more information.

1. Drive clutch rollers and bushings. Driven clutch rollers, pins, and spring.
2. Clutch sheave faces. Clean and inspect for wear.
3. CVT system sealing. The CVT system is air cooled by fins on the drive clutch. The fins create a low-pressure area around the drive clutch. The clutch cover must be sealed to ensure water and other contaminants entering the CVT area.

DRIVE CLUTCH OPERATION

Drive clutch primarily sense engine RPM. The major components, which controls shifting function, are the shift centrifugal weights (rollers) inside the moveable sheave. Whenever engine RPM is increased, centrifugal force is created, causing the rollers to push against the cam plate and force the moveable sheave toward the drive belt. This motion pinches the drive belt between the spinning sheaves and causes it to rotate, which in turn rotates the driven clutch. If belt speed is sufficient, centrifugal friction shoes on the driven clutch overcome their return spring pressure and swing outward against the transmission drive hub, and the vehicle (if in gear) begins to move. At lower RPM, the drive belt rotates low in the drive clutch sheaves. As engine RPM increases, centrifugal force causes the drive belt to be forced upward on drive clutch sheaves, changing the ratio of the drive to driven clutch from low to high.

DRIVEN CLUTCH OPERATION

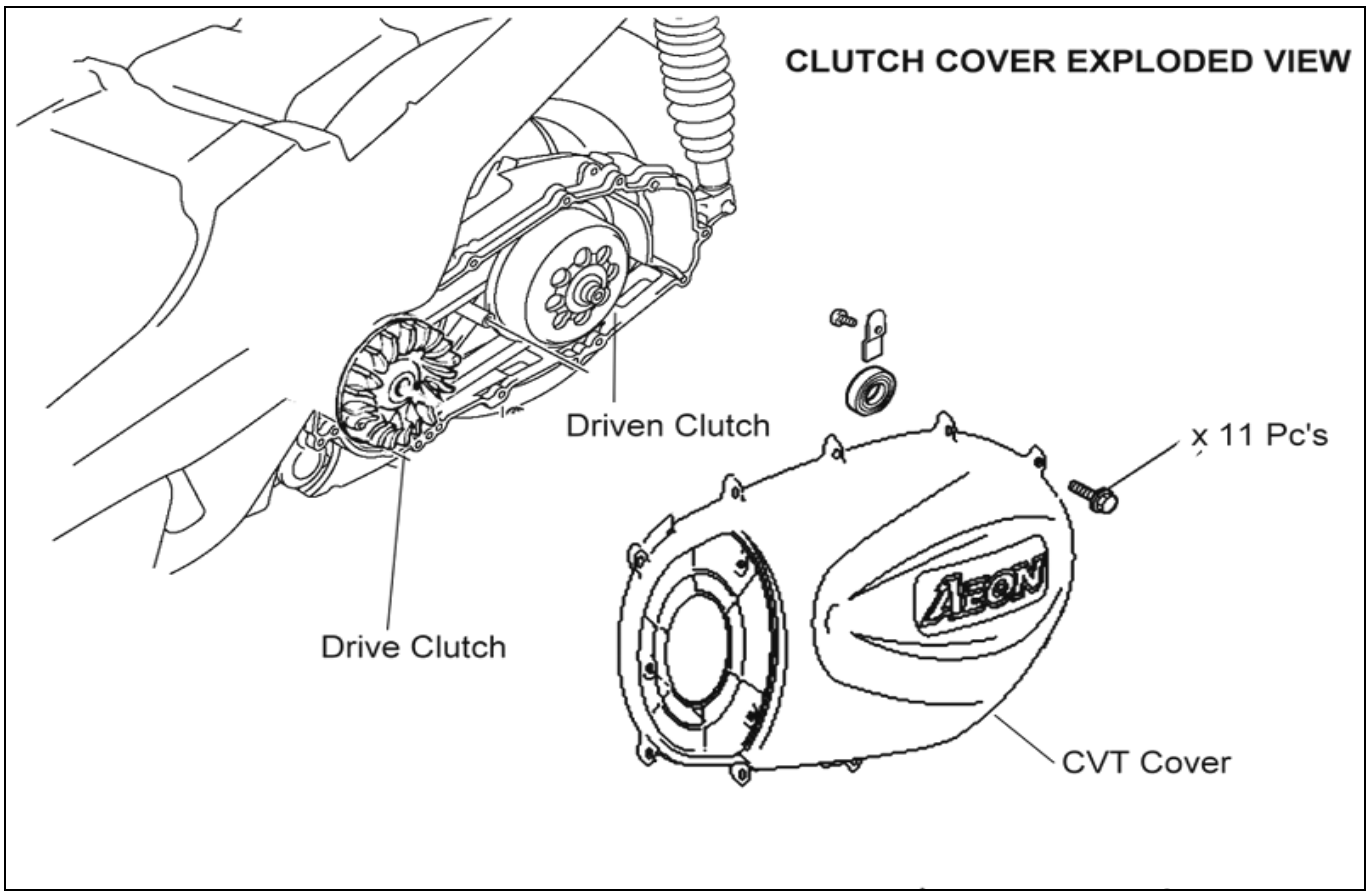
CVT driven clutches primarily sense torque, but also react to RPM, applying and retracting the friction shoes according to the forces applied to it from the drive belt, while at the same time reacting to the torque at the transmission input shaft. If the torque resistance at the transmission input shaft is greater than the load from the drive belt, the drive belt is kept at the outer diameter of the driven clutch sheaves (low ratio).

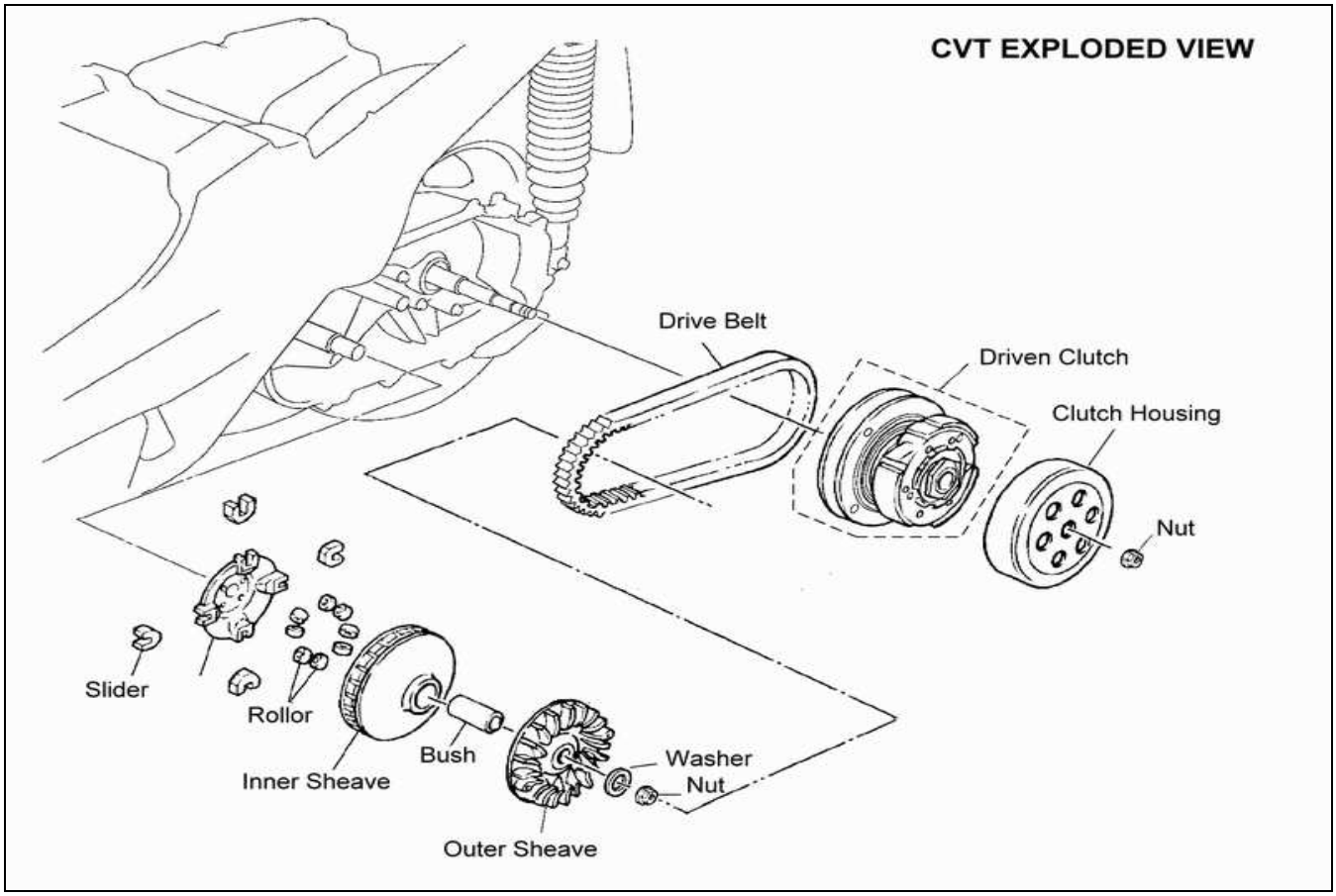
As engine RPM and horsepower increase, the load from the drive belt increases, resulting in the belt rotating up toward the outer diameter of the drive clutch sheaves and downward into the sheaves of the driven clutch. This action, which increases the driven clutch speed, is called up shifting.

Should the throttle setting remain the same and the vehicle is subjected to a heavier load, the torque sensing driven clutch will close, forcing the drive belt back up toward the outer diameter of the driven clutch. This also forces the belt downward into the sheaves of the drive clutch. This action, which decreases the driven clutch speed, is called back shifting.

In situations where loads vary and throttle settings are constant, the drive and driven clutches are continually shifting to maintain optimum engine RPM. At full throttle a perfectly matched CVT system should hold engine RPM at the peak of the power curve. This RPM should be maintained during clutch up shift and backshift. In this respect, the CVT system is similar to a power governor. Rather than vary throttle position, as a conventional governor does, the CVT system changes engine load requirements by either up shifting or back shifting.

CVT SYSTEM


CLUTCH COVER EXPLODED VIEW
Driven Clutch
x 11 Pc's
Drive Clutch
CVT Cover


CVT EXPLODED VIEW
Drive Belt
Driven Clutch
Clutch Housing
Nut
Slider
Rollor
Inner Sheave
Bush
Washer
Nut
Outer Sheave

CVT SYSTEM

CVT OVERHEATING / DIAGNOSIS

During routine maintenance or whenever CVT system overheating is evident, it's important to check the inlet *and* outlet ducting for obstructions. Obstructions to air flow through the ducts will significantly increase CVT system operating temperatures. The ATV should be operated in LOW RANGE (if equipped) when pulling or plowing heavy loads, or if extended low speed operation is anticipated.

GENERAL RANGE OPERATION GUIDELINES:	Heavy loading, basic operational speeds less than 10Km, riding through rough terrain (swamps, mountains, etc.), low ground speeds.
	High ground speeds, speeds above 30Km.
Diagnosis of Clutch Drive Belt & Cover Related Issues:	
Possible Causes	**Solutions/What to do**
Heaving Loading onto the scooter when in high range.	Drive to low speed during loading of the scooter to prevent belt burning.
Starting out going up a steep incline.	When starting out on an incline, applying the brake and perform the "K" turn.
Driving at low RPM or low ground speed (At approximately 5--12 km).	Drive at higher speed for cooler CVT operating temperatures and longer component life.
Insufficient warm--up of exposed to low ambient temperatures.	Warm engine at least 5 min., then with transmission in neutral, advance throttle to approx. 1/8 throttle in short bursts, 5 to 7 times. The belt will become more flexible and prevent belt burning.
Slow and easy clutch engagement.	Fast, effective use of the throttle for efficient engagement. Continuous operation at the point of engagement (initial vehicle movement) increases CVT temperatures and component wear.
Stuck in mud or snow.	Reduce to Low RPM, carefully use fast, aggressive throttle application to engage clutch. **Warning: Excessive throttle may cause loss of control and scooter overturn.**
Belt slippage from water or snow ingestion into the CVT system.	Let engine keep in idle speed. Using the throttle, vary the engine rpm from idle to **3/4 WOT** and test for belt slippage. Repeat several times as required. **During this procedure, the throttle should not be held at the full position**. CVT seals should be inspected for damage if repeated leaking occurs.
Clutch malfunction.	A certified AEON technician should perform Inspection/repair of clutch components.

CVT SYSTEM

DRIVE CLUTCH REMOVAL

Some fasteners and procedures will vary. Refer to the appropriate parts manual for proper fasteners and fastener placement.

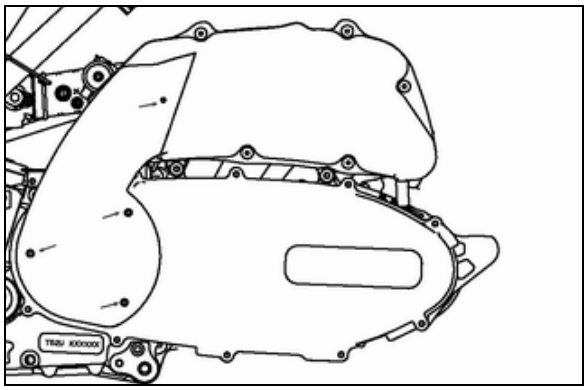
1. Position the scooter on a level surface. Use the center stand.

⚠ WARNING

Serious injury may result if machine tips or falls. Be sure machine is secure before beginning this service procedure.

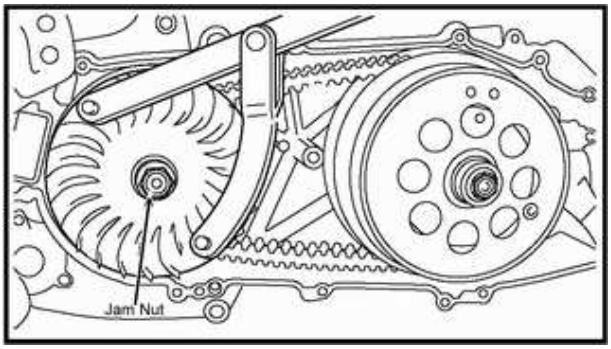
2. Remove seat, storage box and LH plastic panel to gain access to the outer clutch cover.

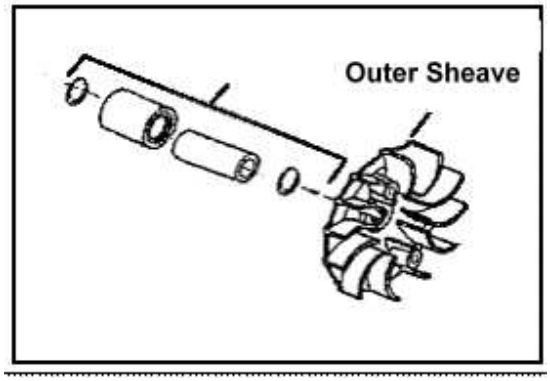
3. Remove the inlet dust screw and inlet duct.



4. Remove outer clutches cover screws and the clutch cover.

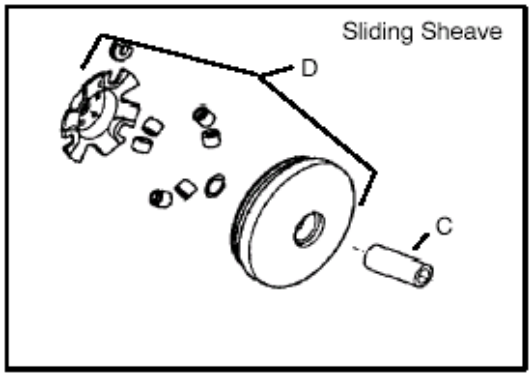
5. Remove outer sheave from crankshaft.



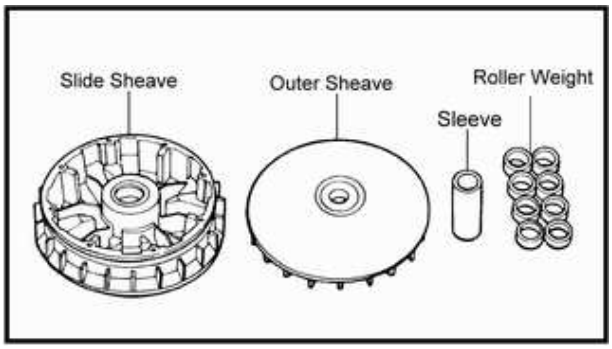


7. Remove belt.

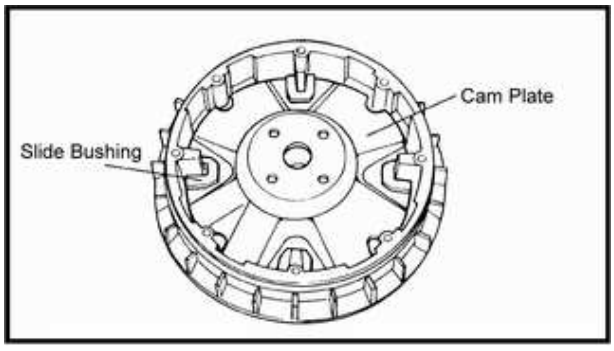
6. Use two hands to hold the cam plate and the primary sliding sheave together when removing the primary sliding sheave and the cam plate assembly. This prevents the roller weights from falling out of the assembly.



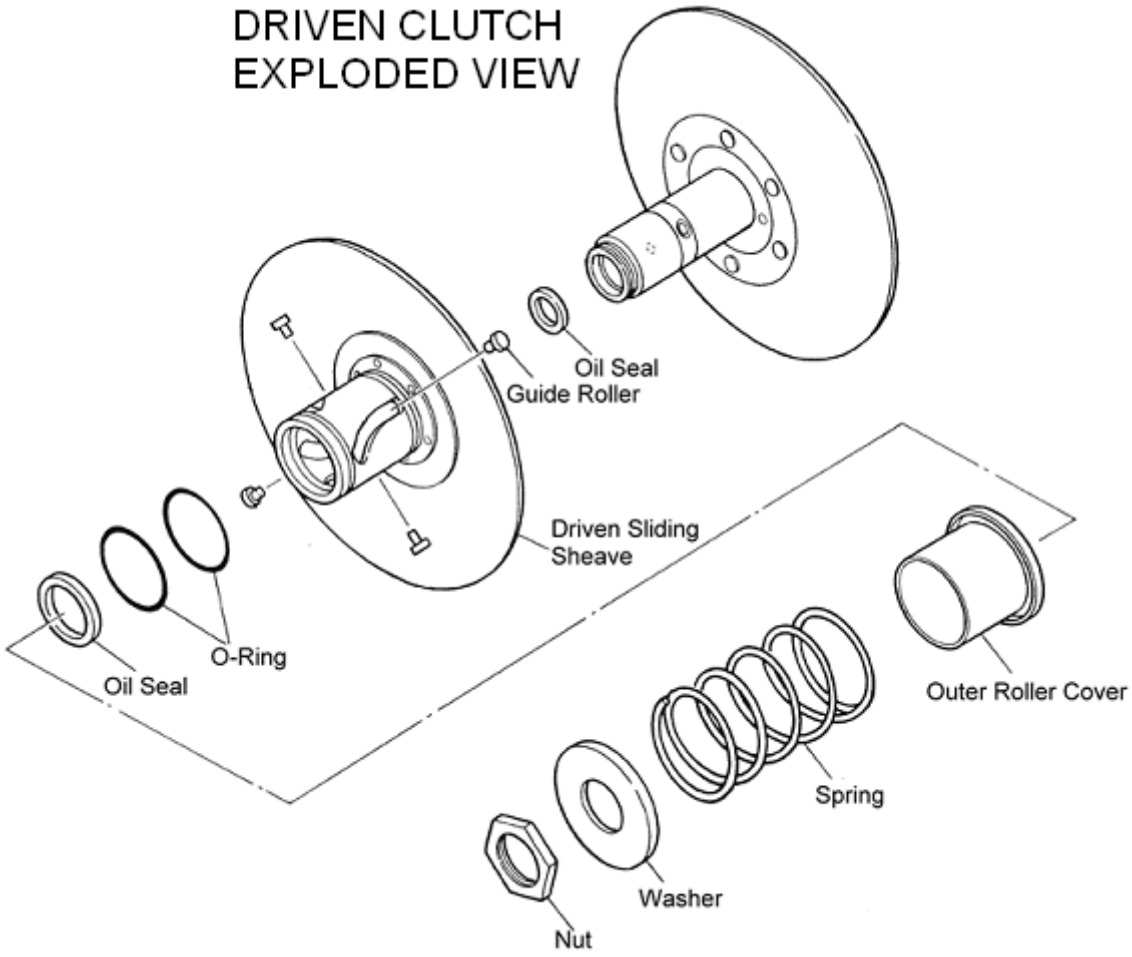
8. Remove the roller weights from the primary sliding sheave. Check the rollers for wear and scoring.



9. Remove and inspect the slide bushings and cam plate. Replace any components that found to be worn excessively or appear abnormal.



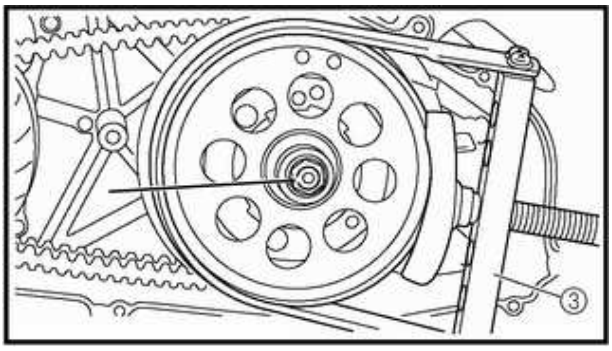
CVT SYSTEM



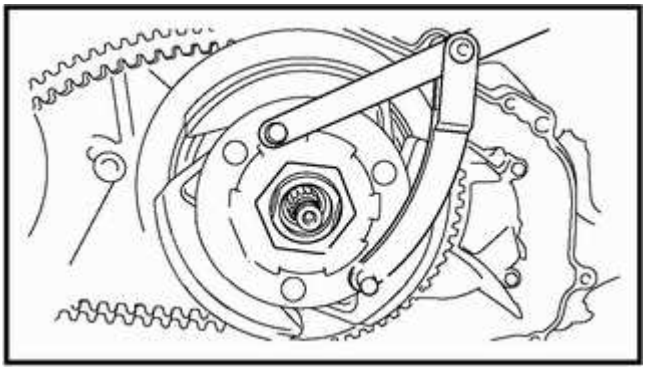
DRIVEN CLUTCH REMOVAL

NOTE: This assembly utilizes a torque limiting system to prevent transmission damage. Use care removing the clutch assembly, as the torque—limiting components become free and could fall apart. Mark or note parts during disassembly.

1. Hold the driven clutch housing then releasing the nut from the shaft.



2. Remove the nut by pincer and air wrench.



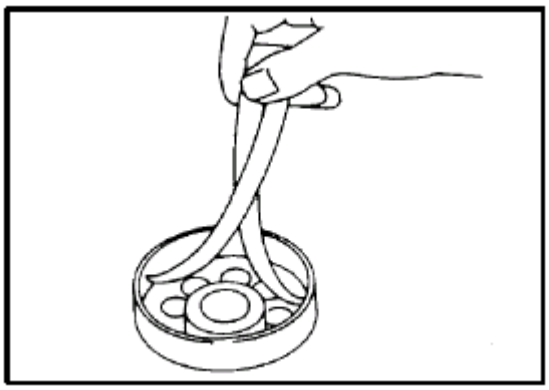
3. Pull the entire clutch off as an assembly.

4. Set the driven clutch assembly on a flat surface.

Remove the cover. Inspect components for excessive wear or damage. Replace components as required.

DRIVEN CLUTCH DISASSEMBLY AND INSPECTION

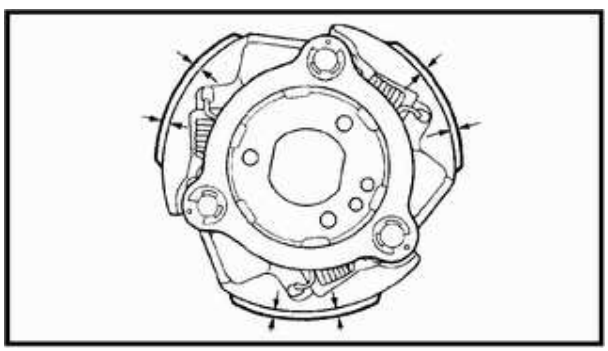
1. Inspect the condition of the clutch drum. Measure the inside diameter of the cover at 90 degree intervals using a caliper. Inspect the condition and diameter of the drum lining. If either the measurements or the lining indicates excessive wear, replace the clutch cover.



CAUTION

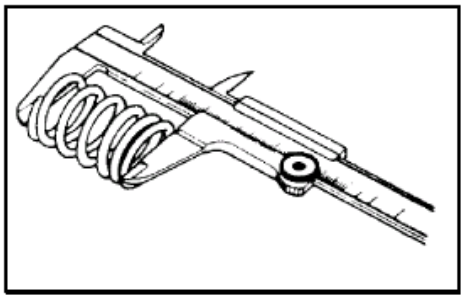
Spring pressure can cause components to eject suddenly. Use care during removal.

1. Secure the assembly in a clamping device. To access the driven spring, mark and remove the outer sheave-retaining nut. Remove the friction pad assembly and driven spring.
2. Inspect the condition of the clutch drum. Measure the inside diameter of the cover at 90 degree intervals using a caliper. Inspect the condition and diameter of the drum lining. If either the measurements or the lining indicates excessive wear, replace the clutch cover.



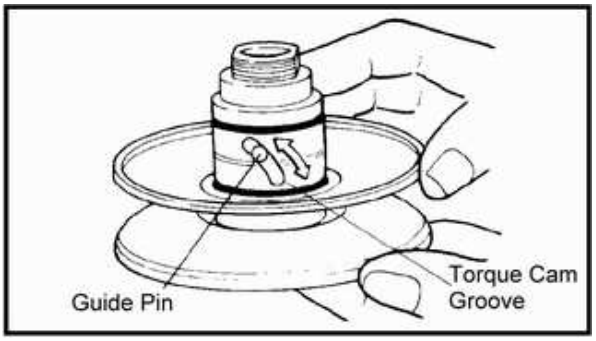
Driven Clutch Friction Pad
Service Limit: 2 mm (0.078")
Driven Clutch Hub I. D.:
Service Limit: 153 + 0.2 mm

3. Use a caliper to check the length of the compression spring. At full extension, the measurement should be no less than 130 mm. If out of specification, replace the spring.

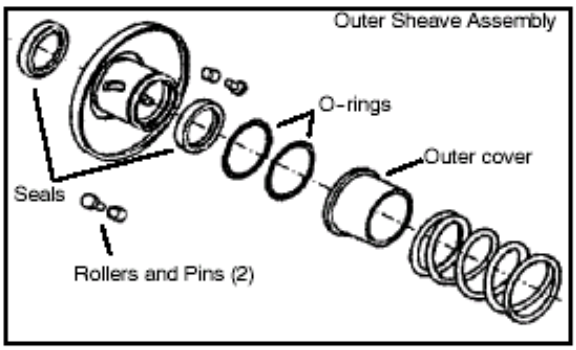


Driven Compression Spring
Service Limit:
130 mm (51.2")

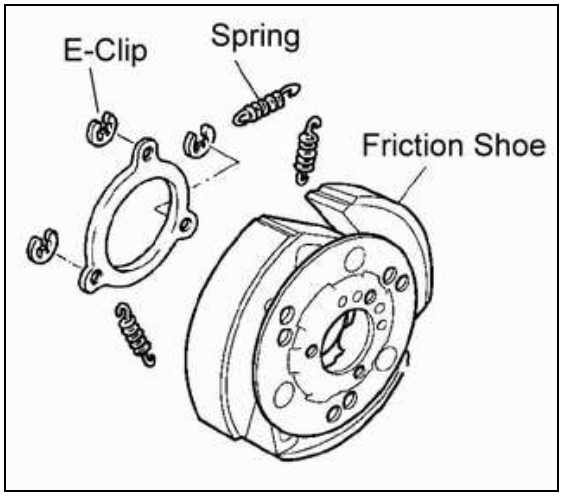
4. Remove the outer guide pin cover by turning and pulling up on the cover. Replace the 2 o--rings.

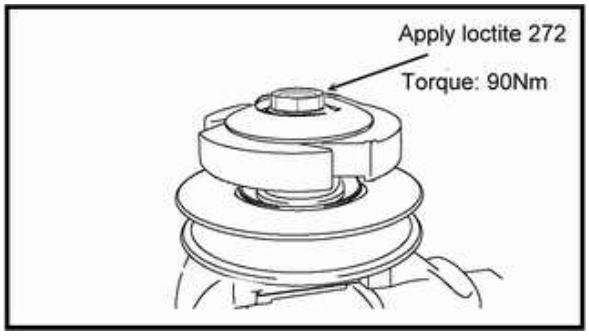


5. Remove the rollers and pins using a needle—nose pliers and inspect all components. Replace if any damage or excess wear is found. Replace the o--rings and seals anytime the driven is apart.



6. To replace the friction shoes, remove the e—clips that retain the backing plate. Use a suitable tool to remove and install the springs connecting the shoes, using care not to over--stretch the springs more than is necessary.



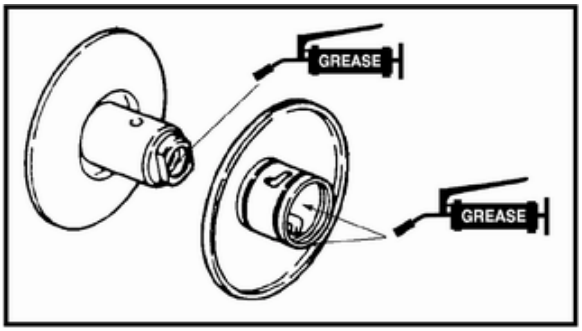


DRIVEN CLUTCH ASSEMBLY

1. Insert new seals into the outer sheave assembly. Fill the outer sheave cavity with fresh grease and slide onto the inner sheave shaft. Align and insert the roller/pin assemblies. Install new o-rings and the outer roller pin cover. Place the washer onto the threaded shaft and apply Loctite 272 to the threads.

NOTE: Outer sheave retaining nut replacement is strongly recommended. Use Loctite 272 on the threads during reassembly.

Driven Assembly Nut Torque
90 Nm (67 ft. lbs.)

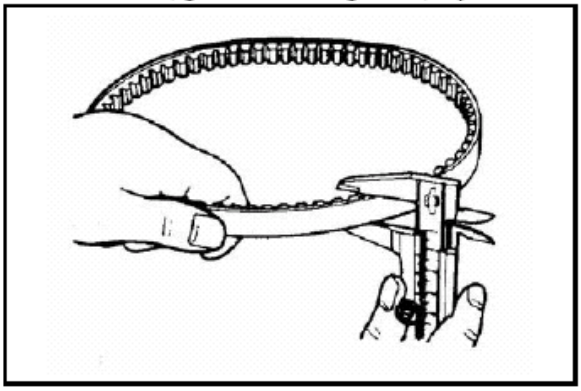


2. Have an assistant available for final assembly.

Install the compression spring. Place the friction pad assembly over the spring and compress the driven assembly together with both hands. With the assembly compressed and the threads exposed, have an assistant thread a new retaining nut onto the shaft. Secure the assembly in a clamping device and torque the retaining nut to **90 Nm**.

CVT Belt Inspection

3. Inspect the surface of the drive belt for uneven wear or grease deposits. Using a caliper, measure the width of the belt. The service limit of the belt is **24 mm**. If the width of the belt is less than the service limit, or if the belt is worn, glazed or hour--glassed, replace.

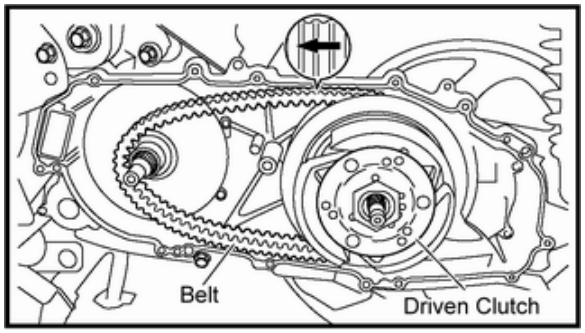


CVT Drive Belt Width Service Limit: 24mm	Driven Assembly Nut Torque 50 Nm (37 ft. lbs.)

4. Install the drive clutch assembly into Crankshaft.

5. Install the drive belt on driven clutch sheave side and move belt as far into the sheaves as possible.

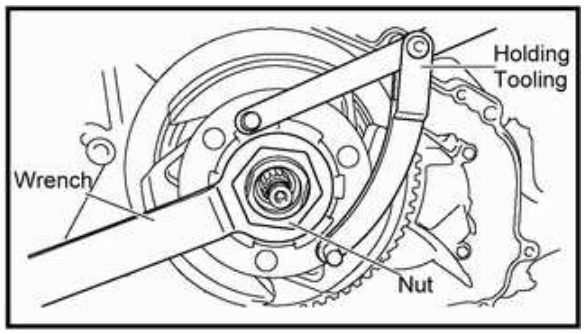
6. Install the V-belt with the printed arrow mark on the V-belt facing in the direction shown in the illustration.



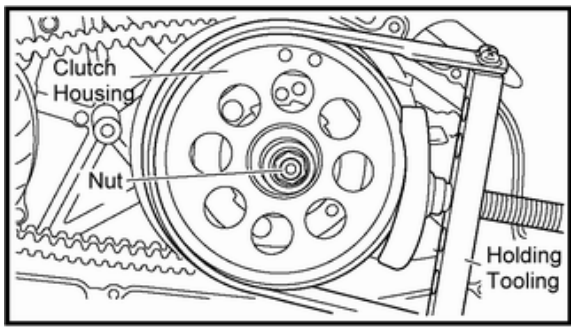
CAUTION

Do not allow grease to contact the V-belt and the secondary sheave assembly.

7. Holding the clutch shoe assembly with the holding tool tighten the clutch shoe assembly nut to 90Nm with the locknut wrench.



8. Hold the clutch housing with the holding tooling; tighten the clutch-housing nut to 50Nm.

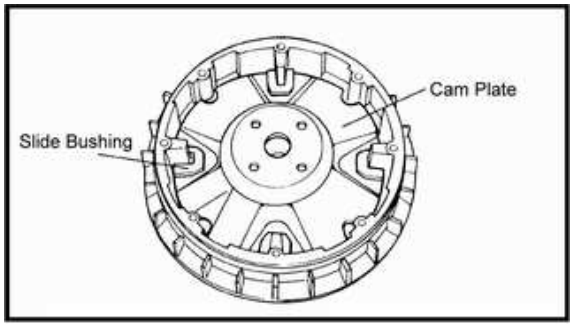


DRIVE CLUTCH DISASSEMBLT AND INSPECTION

1. Remove outer drive clutch sheave and drive belt. Note parts assembly order.

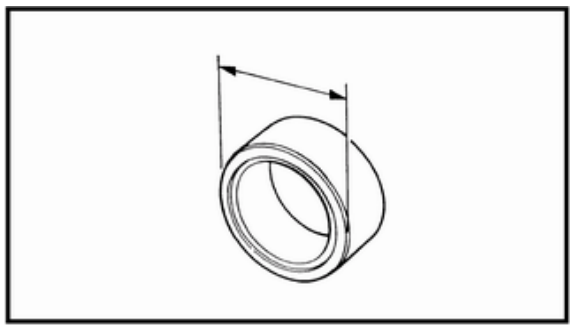
2. Slide sheave and cam plate off crankshaft as an assembly.

NOTE: When removing primary sliding sheave and cam plate assembly, hold cam plate and sliding sheave together. This prevents the rollers from falling out of the assembly.

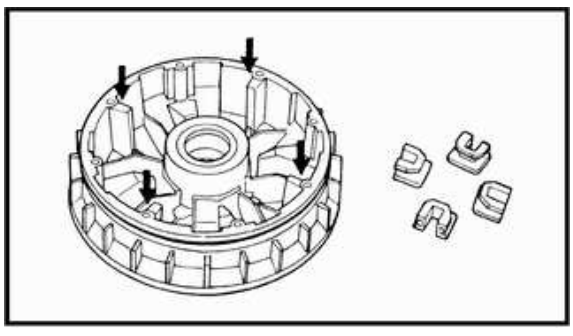


3. Remove cam plate.

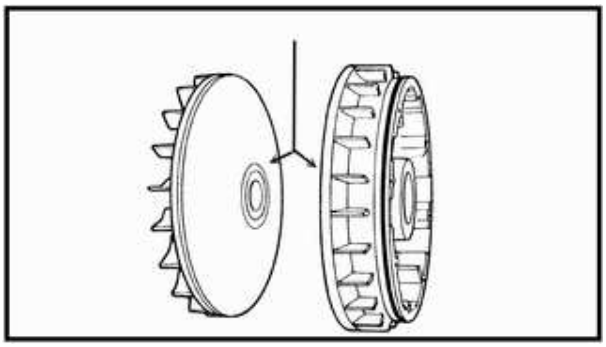
4. Inspect surface of roller weight for wear or damage. The outside diameter is 23.2mm and the service limit is 22.7mm.



5. Inspect surface of slide sheave; slide bushing and cam plate for wear, pitting, or damage.

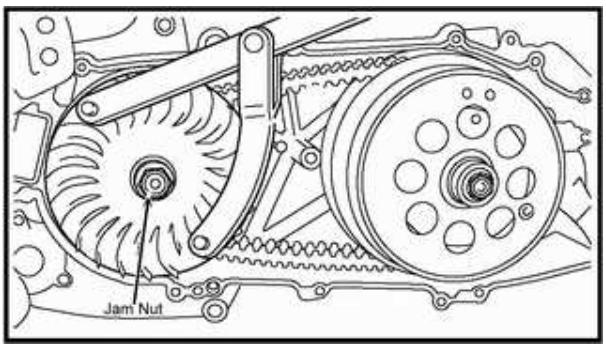


6. Inspect belt-contacting surface of both sheave for wear or damage.

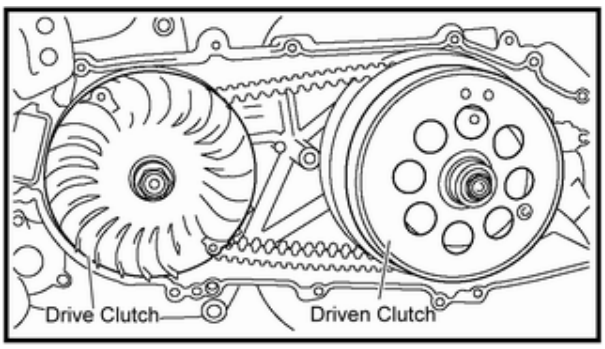


DRIVE CLUTCH ASSEMBLY

1. Install the V-belt onto the drive clutch assembly when the pulley is at its widest position.
2. Install the drive clutch outer sheave when the pulley is at its narrowest position.
3. Ensure the V-belt is tight.



4. Holding the primary fixed sheave with the rotor holding tool, install washer and nut tighten the drive clutch nut to 100 Nm.



Drive Clutch Lock Nut Torque: 100 Nm (74ft-lbs)

ENGINE

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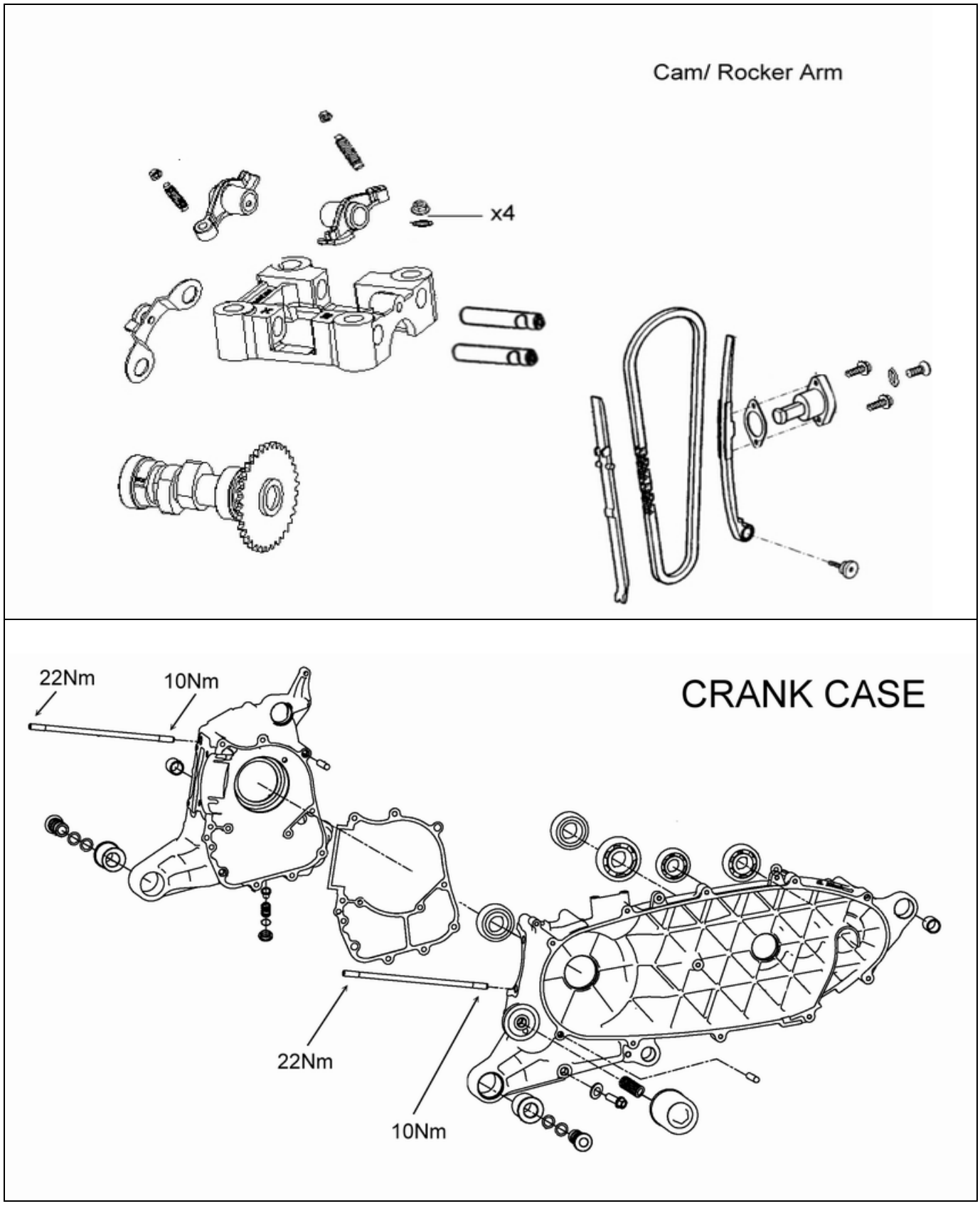
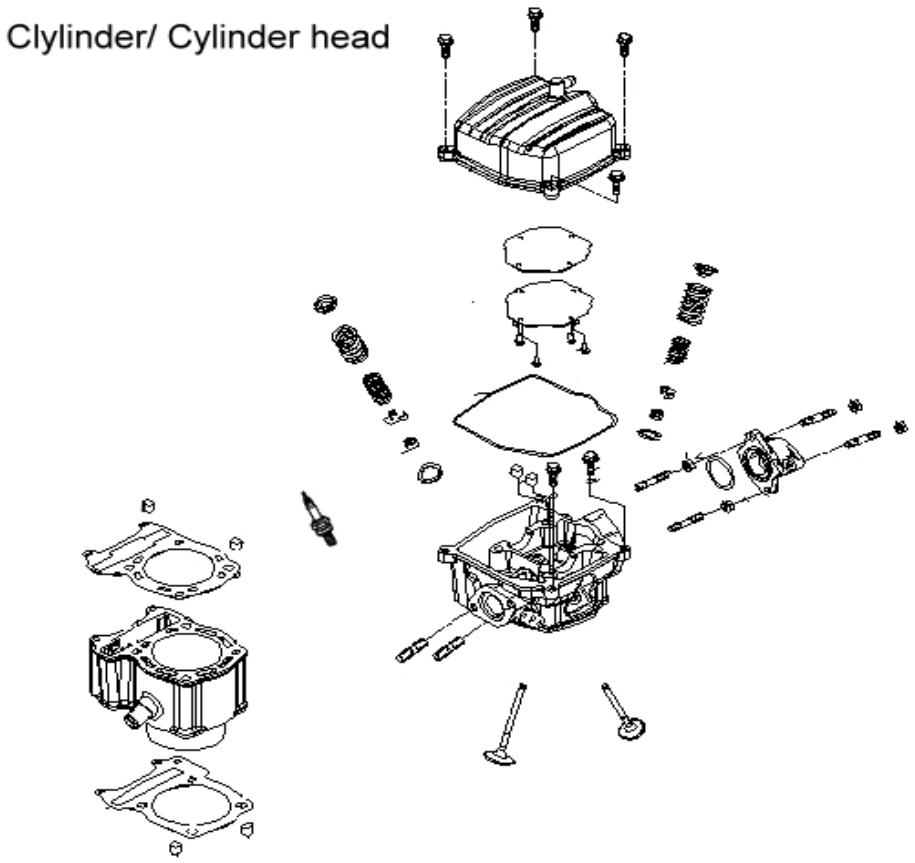
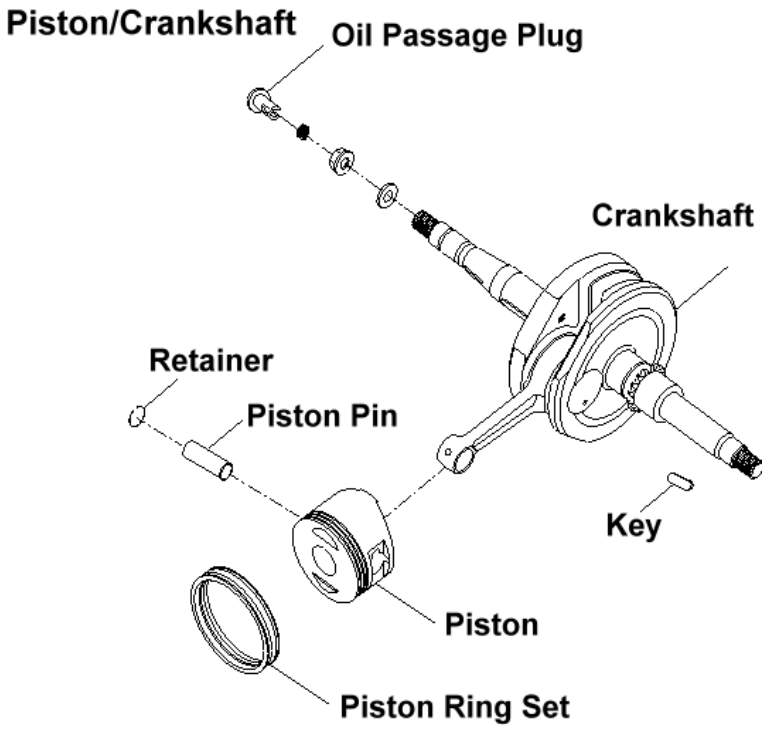
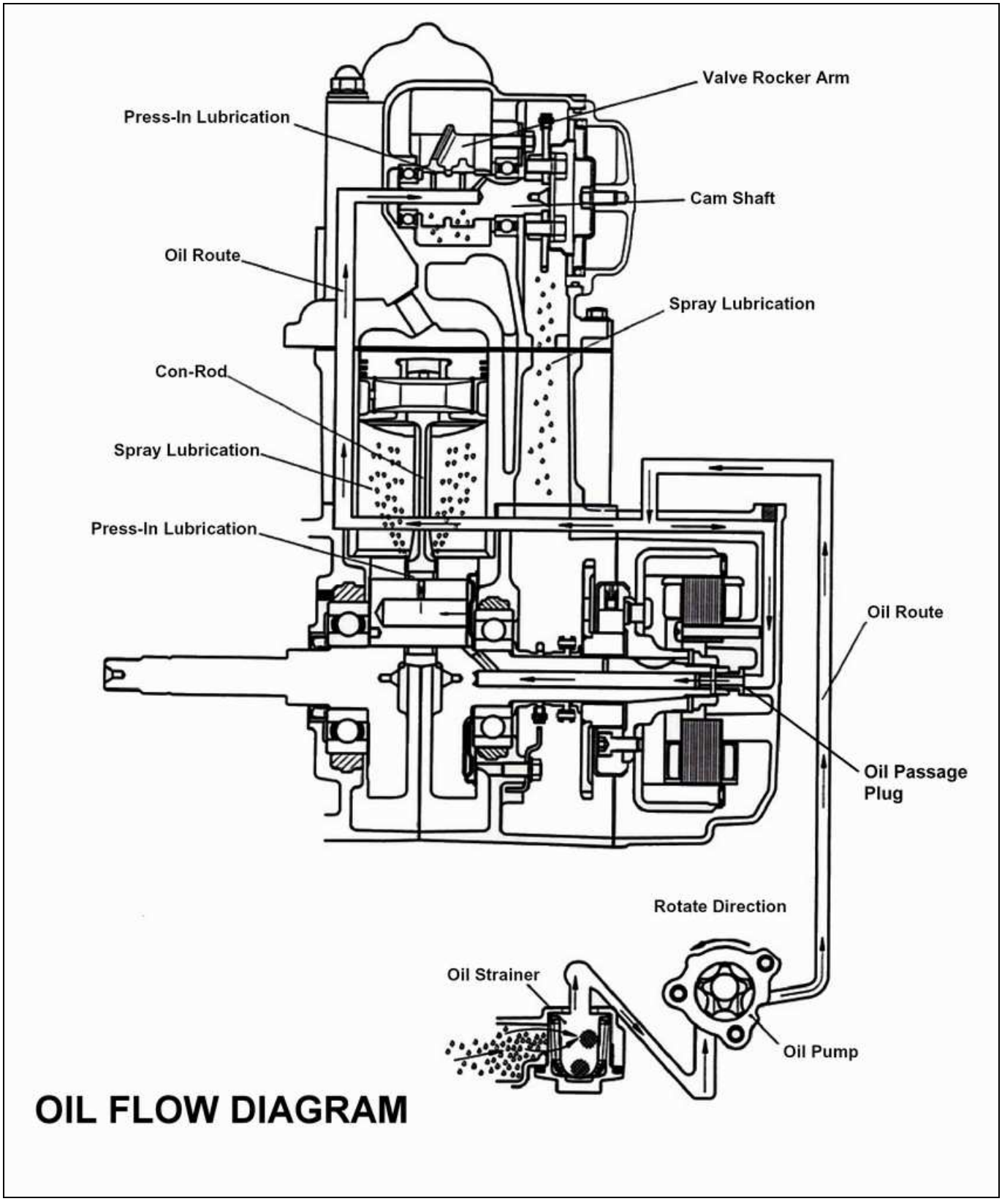


ENGINE

ENGINE EXPLODED VIEW 2

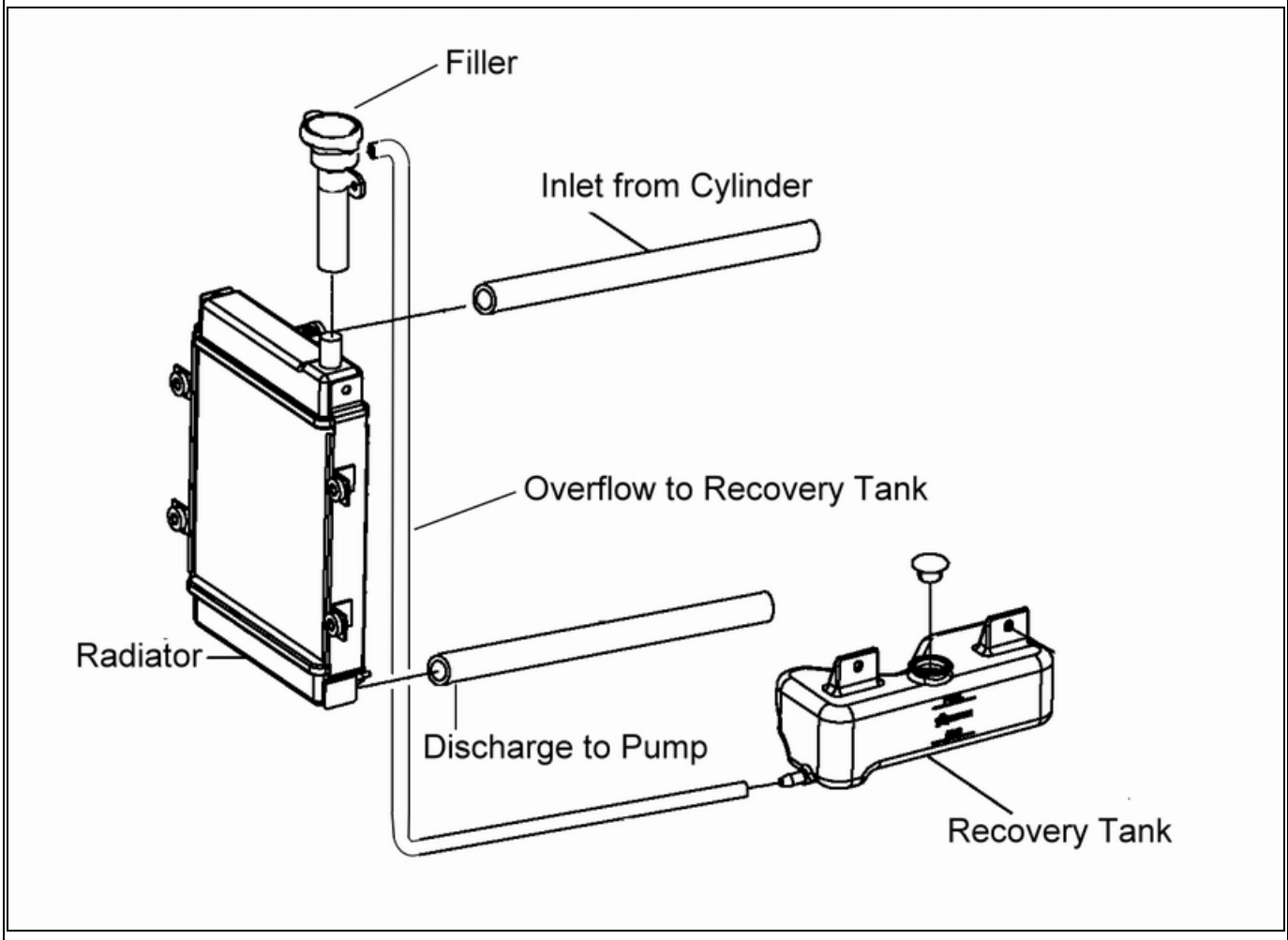


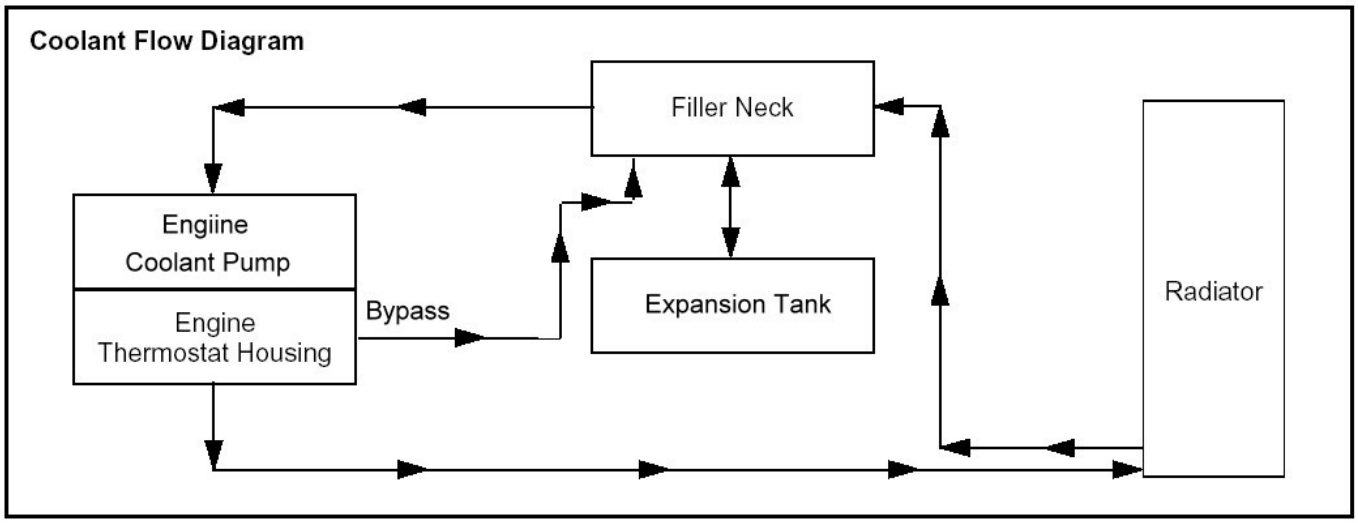




OIL FLOW DIAGRAM

COOLING SYSTEM EXPLODED VIEW





ENGINE

COOLING SYSTEM SPECIFICATIONS

Condition	Specification
Thermostat Open	80° C
Thermostat Full Open	95° C
System Capacity	1200CC
Fan Switch "Off"	70° C
Pressure Cap Relief	0.9 Bar

Recommended Coolant

Use only high quality antifreeze/coolant mixed with distilled water in a 50/50 or 60/40 ratio, depending on freeze protection required in your area.

COOLING SYSTEM PRESSURE TEST

1. Remove the battery chamber cover that located under handlebar.

2. Remove pressure cap and pressure test the cooling system using a commercially available pressure tester.

3. The system must maintain 0.7 Bar (10 psi) for five minutes or longer.

If pressure loss is evident within five minutes, check the radiator, hoses; lamps and water pump seals for leakage.

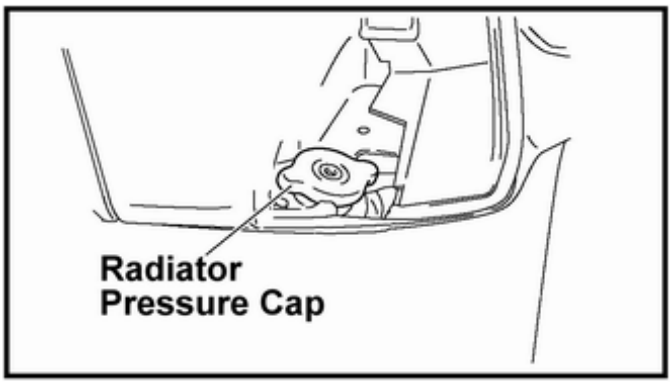
PRESSURE CAP TEST

⚠ WARNING

Never remove pressure cap when engine is warm or hot. The cooling system is under pressure and serious burns may result. Allow the engine and cooling system to cool before servicing.

1. Remove pressure cap and test cap using a commercially available pressure cap tester.

2. The pressure cap relief pressure is 0.9 Bar (13 psi). Replace cap if it does not meet this specification.



TROUBLE DIAGNOSIS

Engine temperature is too height

- Water thermometer and temperature sensor don't work properly.
- The thermostat is stuck to closed.
- Insufficient coolant.
- Water hose and jacket are clogged.
- Fan motor malfunction.
- The filler cap of radiator malfunction.

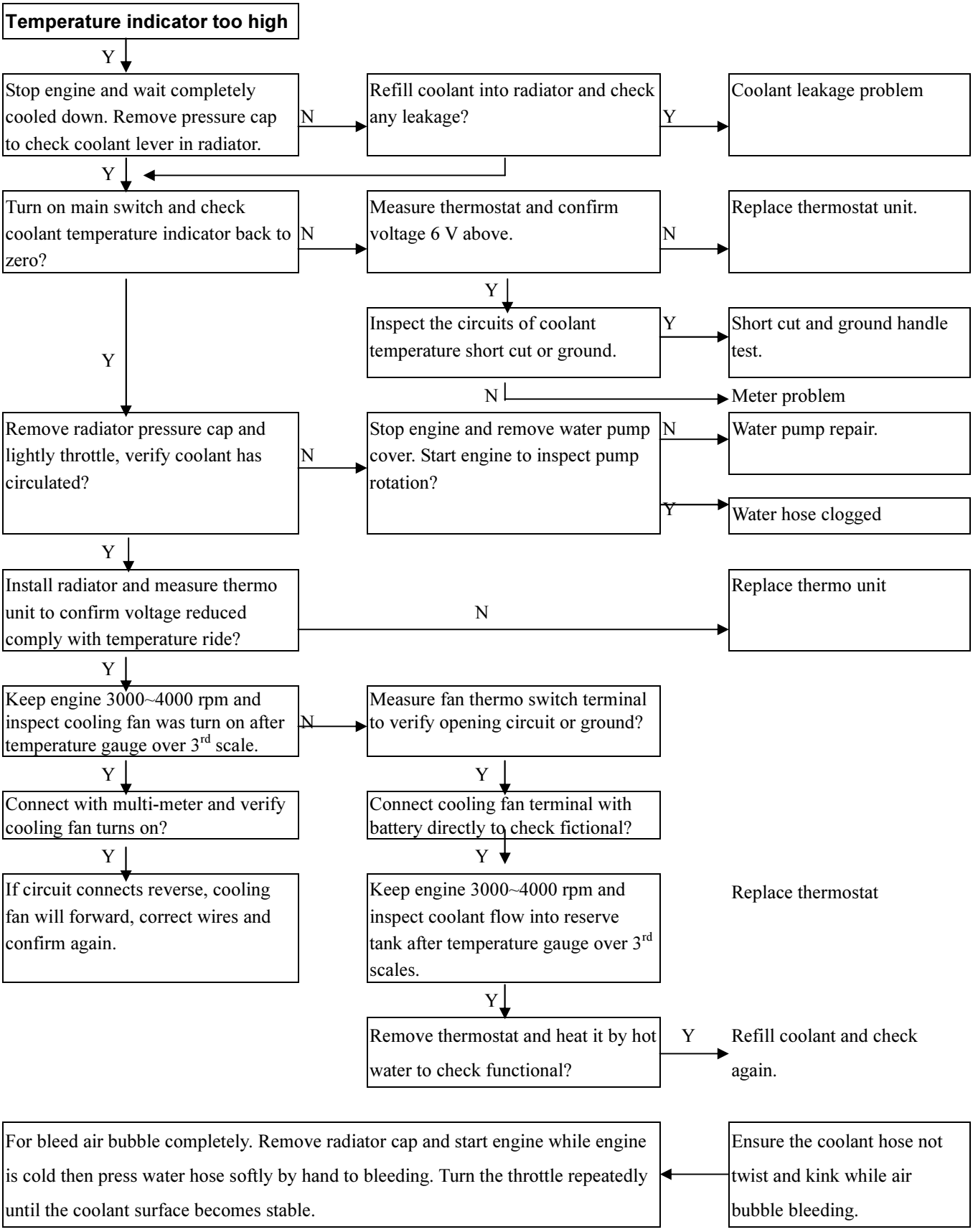
Engine temperature is too low

- Water thermometer and temperature sensor malfunction.
- Thermostat is stuck to open.

Coolant leaking

- Water-Pump mechanical seal worn.
- The o-rings located on water pump, thermostat and fan thermo switch are deteriorated.
- The water hoses are broken or aged.

COOLIING SYSTEM FAILURE ELIMINATION CHART

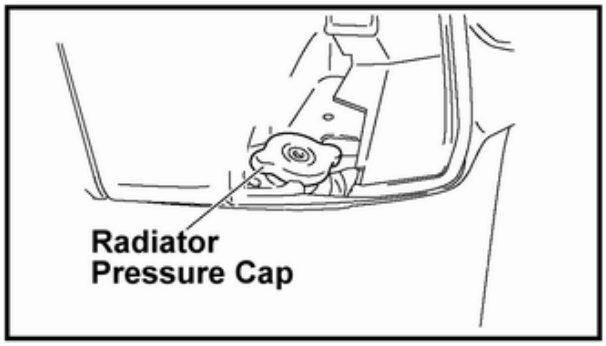

Temperature indicator too high
Y
Stop engine and wait completely cooled down. Remove pressure cap to check coolant lever in radiator.
N
Refill coolant into radiator and check any leakage?
Y
Coolant leakage problem
Y
Turn on main switch and check coolant temperature indicator back to zero?
N
Measure thermostat and confirm voltage 6 V above.
N
Replace thermostat unit.
Y
Inspect the circuits of coolant temperature short cut or ground.
Y
Short cut and ground handle test.
Y
N
Meter problem
Remove radiator pressure cap and lightly throttle, verify coolant has circulated?
N
Stop engine and remove water pump cover. Start engine to inspect pump rotation?
N
Water pump repair.
Y
Water hose clogged
Y
Install radiator and measure thermo unit to confirm voltage reduced comply with temperature ride?
N
Replace thermo unit
Y
Keep engine 3000~4000 rpm and inspect cooling fan was turn on after temperature gauge over 3rd scale.
N
Measure fan thermo switch terminal to verify opening circuit or ground?
Y
Y
Connect with multi-meter and verify cooling fan turns on?
Connect cooling fan terminal with battery directly to check fictional?
Y
Y
If circuit connects reverse, cooling fan will forward, correct wires and confirm again.
Keep engine 3000~4000 rpm and inspect coolant flow into reserve tank after temperature gauge over 3rd scales.
Replace thermostat
Y
Remove thermostat and heat it by hot water to check functional?
Y
Refill coolant and check again.
For bleed air bubble completely. Remove radiator cap and start engine while engine is cold then press water hose softly by hand to bleeding. Turn the throttle repeatedly until the coolant surface becomes stable.
Ensure the coolant hose not twist and kink while air bubble bleeding.

ENGINE

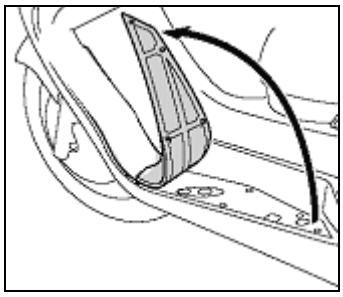
COOLANT REPLACEMENT

1. The cooling system can be serviced on the motorcycle.

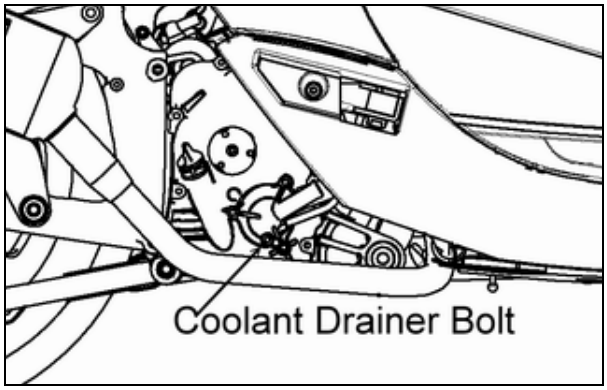
2. Remove radiator pressure cap, which located under handlebar.



3. Remove recovery cap, which located under footrest.



4. Place a water pan under the water pump; remove the drain bolt to drain out the coolant.



5. Reinstall the drain bolt.

6. Refill system with the coolant and bleed out the air bubbles.

COOLING SYSTEM BLEEDING PROCEDURE

⚠ WARNING

Always wear safety glasses and proper shop clothing when performing the procedures in this manual. Failing to do so may lead to possible injury or death.

⚠ CAUTION

Use caution when performing these procedures.
Coolant may be hot and may cause severe injury or burns.

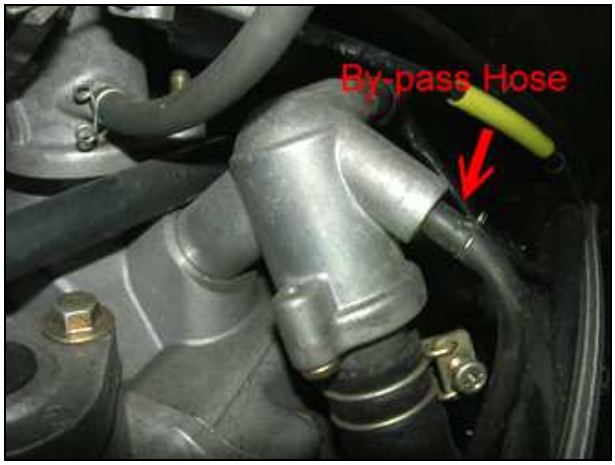
NOTE: If the coolant level is LOW in the radiator, or if there are leaks in the system, the coolant system will not draw coolant from the reservoir tank.

NOTE: Use this procedure when a unit overheats and no apparent leaks in the cooling system are found.

1. Park motorcycle with center stand.

2. Remove recovery bottle cap and fill bottle to the full line.

3. Slightly loosen the bleed hose (bypass hose) to let air escape.



4. Close the bleed hose.

5. Start the engine and let it idle for 5-10 minutes or until the thermostat opens and allows coolant to flow through the system. Bubbles will escape continuing.

6.Until fan start the temperature will cool down and coolant be sucked into coolant system.

7. Squeeze the coolant lines by hand to help purge the system of air.

NOTE: If there is air in the system you will see air bubbles forming through the radiator filler neck.

8. Add coolant to the radiator filler neck if the level goes down.

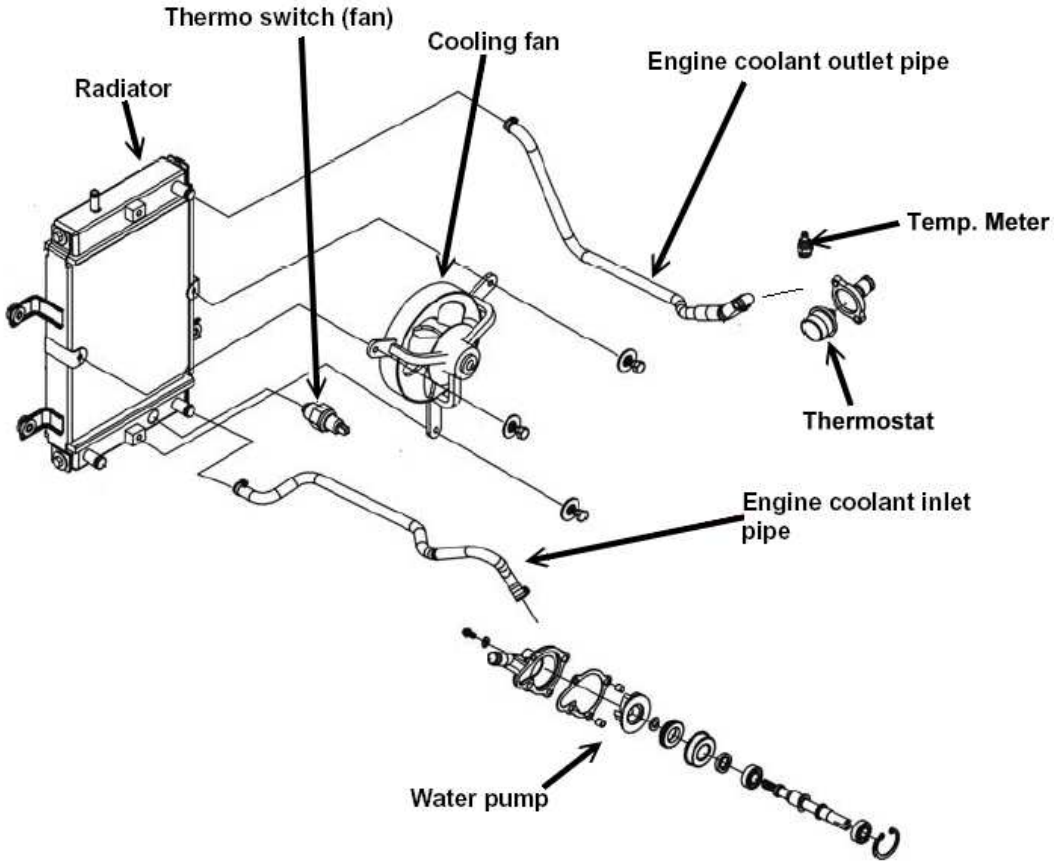
WARNING

Be sure to install the pressure cap before shutting off the engine. Coolant may spit out of the radiator.

9. Repeat 6 to 8 step. If no bubbles are seen at the filler neck, the system should be purged of air.

10. Stop the engine and let cool, top off the radiator filler neck with coolant. If you hear or see a “glug” at the filler neck, or there is a dropping of the coolant level, indicating that coolant has been pulled into the system; Fill the recovery bottle only after you have completely filled the cooling system at the radiator filler neck.

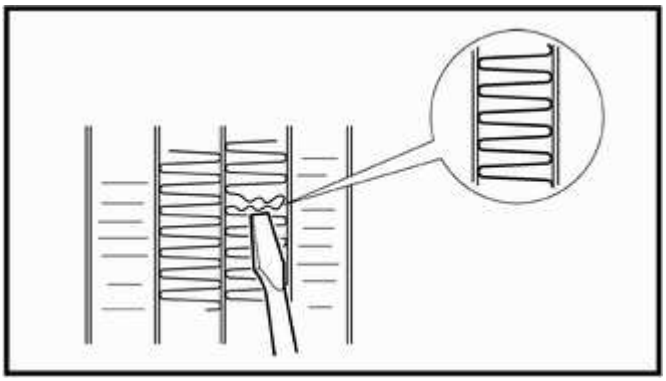
11. Repeat this procedure, if overheating still occurs.



RADIATOR CHECK

1. Check radiator fins for obstruction any time, clean obstruction.

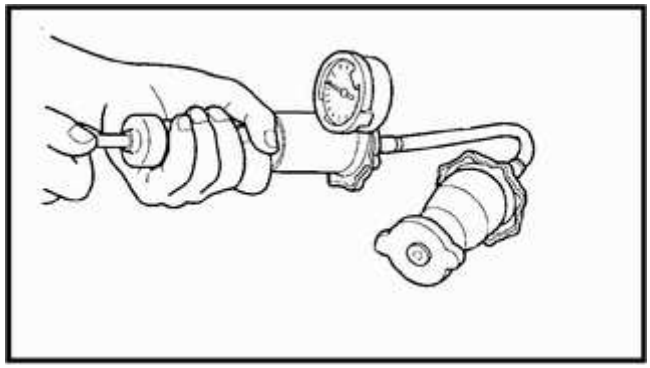
2. Straighten any flattened fins with a thin, flathead screwdriver.



3. Verify the connect radiator hoses for signs of wear, deterioration damaged or leakage. Replace if necessary.

4. Check radiator fan motor for electric function. Repair or replace if necessary.

5. Measure radiator cap opening pressure. The pressure cap relief pressure is 0.9 Bar (13 psi). Make sure pressure maintain for ten seconds and there is no drop in pressure. Replace cap if it does not meet this specification.



Cooling System Pressure Test

1. Remove battery inspection cover.

2. Remove pressure cap and determine the cooling system pressure by using a commercially available pressure tester.

3. The system must keep the 0.7 Bar (10 psi) for five minutes or longer.

If pressure loss is evident within five minutes, check the radiator, hoses or clamps and water pump seals for leakage.

THERMOSTAT CHECKING

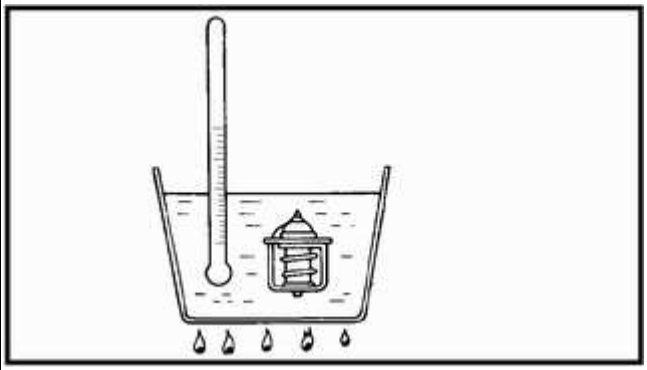
NOTE: A faulty thermostat could cause engine serious overheating or overcooling.

1. Suspend the thermostat in a container filled with water.

2. Slowly heat the water.

3. Place a thermometer into the water.

4. While stirring the water, observe the thermostat and thermometer's indicated temperature.



The thermostat should start open at 65°C and full pen at 80°C.

FAN THERMO SWITCH

1. Connect the fan thermo switch harness with multi-meter

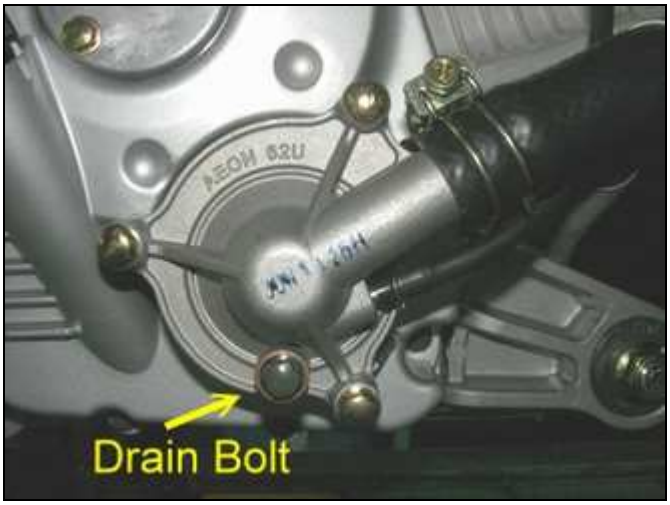
2. Place a thermo switch into the water.

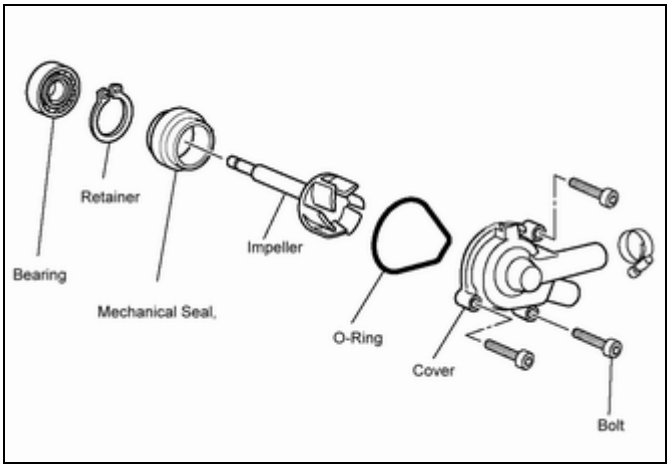
3. Ensure switch connect at 80°C (fan start) and disconnect at 70°C (fan stop).

4. Replace thermo switch if it doesn't meet with specification.

WATER PUMP

Check water pump seal / coolant leaking inspection





1. Check water pump cover, impeller shaft, mechanical seal cracks, damage or wear. □Replace it if these parts damaged.
2. Check bearing rough movement.□ Replace it if bearing worn.
3. Check water pump inlet hose, outlet hose and thermostat inlet hose. Replace it if these crack.

⚠ CAUTION

The mechanical seal and inside seal must be replaced as a unit.

TOP END DISASSEMBLY

ENGINE

PISTON IDENTIFICATION

The piston has an identification mark for piston placement. Note the directional and identification marks when viewing the pistons from the top. The letters “IN” must always be toward the intake side of the engine.

The other numbers are used for identification as to diameter, length and design. Four stroke engine rings are rectangular profile. The numbers or letters on all rings (except oil control rings) must be positioned upward. See text for oil control ring upper rail installation. Use the information below to identify pistons and rings.

ACCESSIBLE COMPONENTS

The following components can be serviced or removed with the engine installed in the frame:

1. Flywheel
2. Alternator/Stator
3. Starter Motor/Starter Drive
4. Oil pump
5. Rocker Arms
6. Throttle Body
7. Injector and all EFI system
8. Transmission
9. Valve gap adjustment

The following components require engine removal for service:

1. Cam Chain and Sprockets
2. Cylinder Head
3. Cylinder
4. Piston/Rings
5. Camshaft
6. Crankshaft
7. Crankshaft Main Bearings
8. Crankcase
9. Transmission
10. Valves

NOTE: Cam chain service requires crankshaft removal, as the chain is located on the pto side of the engine.

NOTE: Crankshaft components are not serviceable. Replace crankshaft as an assembly.

ENGINE REMOVAL

IMPORTANT: Some engine repair procedures can be performed without removing the scooter engine assembly from the vehicle.

⚠ WARNING

Always wear safety glasses and proper shop clothing when performing the procedures in this manual. Failing to do so may lead to possible injury or death.

1. Clean work area.
2. Thoroughly clean the scooter engine and chassis.
3. Disconnect battery cables.
4. Drain engine oil.
5. Drain radiator water.
6. Open the seat then remove the luggage box.
7. Remove all chassis protect shield, both bottom cover, both foot well and both side cover.
8. Disconnect spark plug high-tension lead.
9. Disconnect all electric and EFI wires from the engine.
10. Disconnect radiator tubes.
11. Lift middle of body frame by jack.

12. Remove the following parts as required.

◎ Storage box.

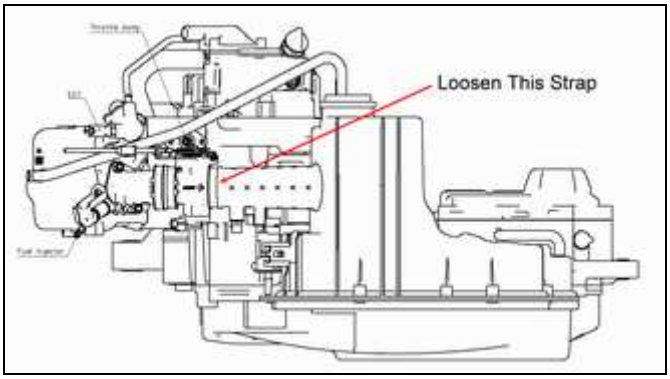
◎ Left and Right Side Covers.

◎ Rear shocks.

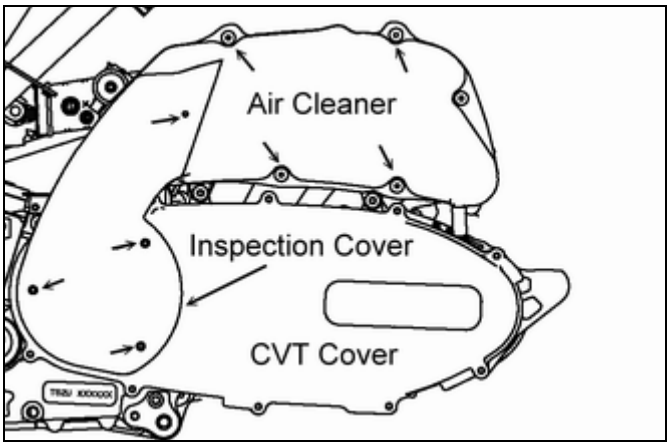
13. Remove exhaust pipe; there are 3 bolt on swing arm and 2 bolts on cylinder.

14. Lift up the rear tire before remove engine mount.

15. Loosen the strap, which between throttle body and air cleaner intake boot. Insert a clean shop towel into the carburetor flange to prevent dirt from entering the intake port.



16. Remove transmission inspection cover and air box.

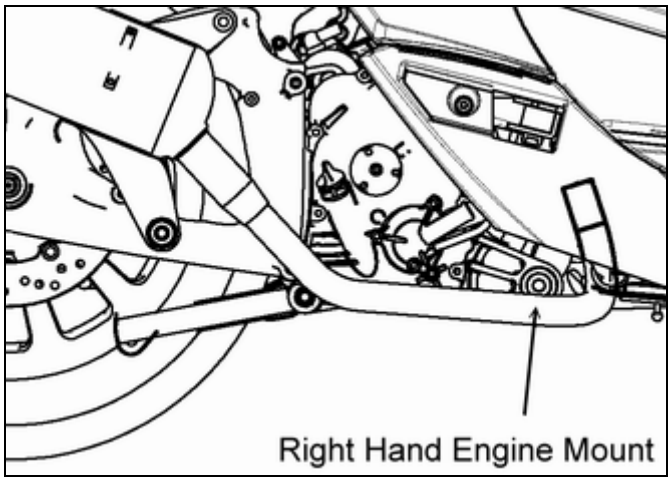


17. Remove Starter motor ground cable. Note ground cable location. Mark positive (+) cable mounting location.

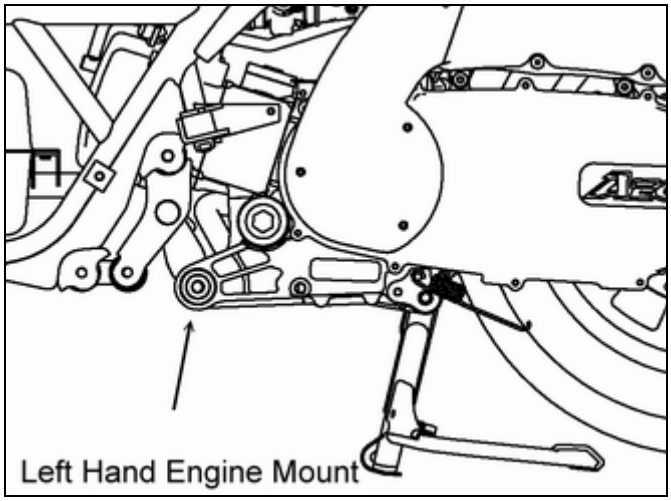
18. Remove engine to chassis ground cable.

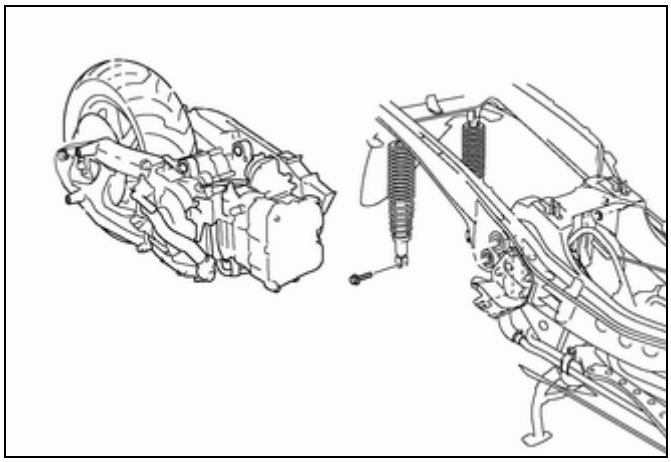
19. Remove all engine mount nuts and shafts.

20. Remove engine with rear wheel as an assembly toward rear side of frame.



LEFT HAND ENGINE MOUNT





ENGINE

ENGINE INSTALLATION NOTE

After the engine is installed in the frame, review this checklist and perform all steps that apply.

⚠ WARNING

Always wear safety glasses and proper shop clothing when performing the procedures in this manual. Failing to do so may lead to possible injury or death.

General Items

◎ Install previously removed components using new gaskets, seals, and fasteners where applicable.

◎ Perform regular checks on fluid levels, controls, and all important areas on the vehicle as outlined in the daily pre-ride inspection checklist (refer to Chapter 2).

CVT System

◎ Clean clutch sheaves thoroughly and inspect inlet and outlet ducts for proper routing and sealing.

◎ Inspect clutch rollers, shoes and springs before reassembly.

Transmission

◎ Inspect transmission operation and adjust linkage if necessary.

Exhaust

◎ Replace exhaust gaskets. Seal connections if desired with high temp sealant.

◎ After running the engine, verify all bolted exhaust connections are tight and in good condition.

Engine Mount Torque

◎ **Front Mount – 80Nm**

◎ **Rear Mounts (lower shock) – 30Nm**

◎ **Rear Wheel shaft Nut – 130Nm**

Engine Break In Period

4 Cycle Engine Break-In Period is defined as the first 10 hours of engine operation or a full tank of fuel.

◎ Use only All Season Synthetic Oil, or API certified "SH" oil.

◎ Use fuel with a minimum octane of 87 (R+M)/2 method.

◎ Change break-in oil and filter at 20 hours or 100 miles, whichever comes first.

Radiator System

◎ Use only 50% coolant water(50% Ethylene Glycol and 50% water) in radiator, do not fill only water.

⚠ CAUTION

Do not bent or squeeze each wires or hose. Route all cables and wires in accordance with the routine layout.

ENGINE LUBRICATION

Oil Type 0--40W Synthetic oil.

Capacity Approximately 1800 cc

Drain Plug/ Screen Fitting 20 Nm

Oil Pressure Specification: Continuous oil flows out of stator housing plughole at Idle RPM. 0W--40 Synthetic

⚠ WARNING

Oil temperature can cause serious injury and damage. Wear the proper safety gear when performing these procedures.

NOTE: Due to the engine assembly having a majority of roller bearings, oil pressure readings hot or cold will be very low. Low oil pressure is not an indication of an oil delivery problem.

1. Remove center plug from the stator housing on the crankcase.

2. Insert an M6x8--1.00 oil pressure gauge adaptor into the crankcase and attach a low pressure gauge (0--10psi / 0--70kpa).

3. Start engine and allow it to reach operating temperature while monitoring gauge indicator.

Any pressure above zero is an indication of good oil flow.

ENGINE

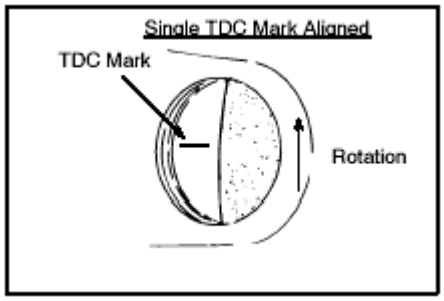
CAM CHAIN TENSIONER REMOVAL

1. Remove oil fill cap from the stator housing and valve cover.

To position crankshaft at Top Dead Center (TDC) on compression stroke:

2. Rotate engine slowly in the direction of rotation watching intake valves open and start to close.

3. Continue to rotate engine slowly while watching camshaft sprocket marks and the mark in the timing inspection hole.



4. Align single (TDC) mark on flywheel with in the inspection hole, and the cam sprocket pin (facing upward) aligned with the camshaft to crankshaft centerline.

NOTE: The sprocket marks align with gasket surface, the cam lobes should be pointing down and the valves should have clearance at this point.

5. Remove the two cam chain tensioner flange bolts.

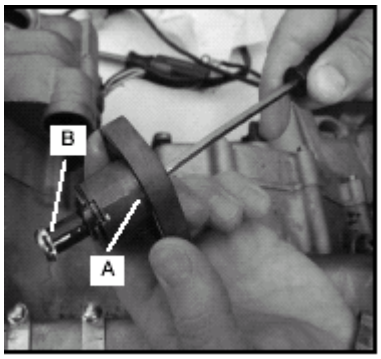
CAUTION
The plunger is under spring tension. **Maintain inward pressure while removing.**

6. Using a screwdriver, turn the tensioner clockwise to retract the plunger. The plunger should move smoothly in and out of the tensioner body.

7. Replace entire tensioner assembly if any part is worn or damaged.

CAM CHAIN TENSIONER INSPECTION

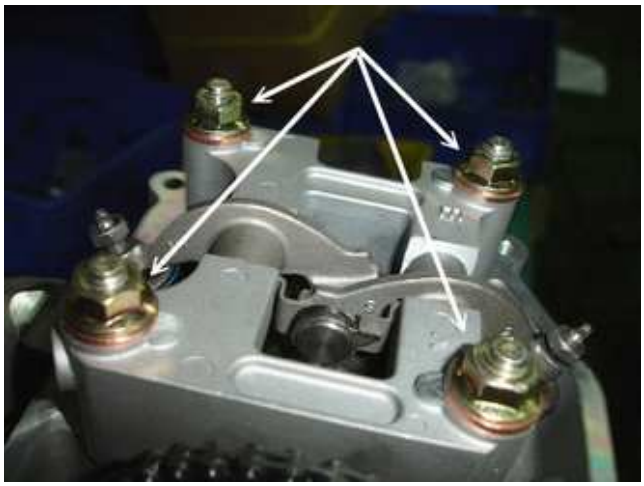
1. Allow cam chain tensioner plunger to extend outward to the end of its travel. Inspect tensioner
(A) and (B) plunger for wear or damage.



ROCKER ARM / SHAFT DISASSEMBLY AND INSPECTION

NOTE: Orientation of the components is important for reassembly. Mark all components before disassembly.

1. Loosen each of the four cylinder head nuts evenly 1/4 turn each time in a cross pattern until loose.



2. Remove bolts and taps the cam support tower with a plastic hammer until loose.

3. Remove the rocker shaft locking plate.

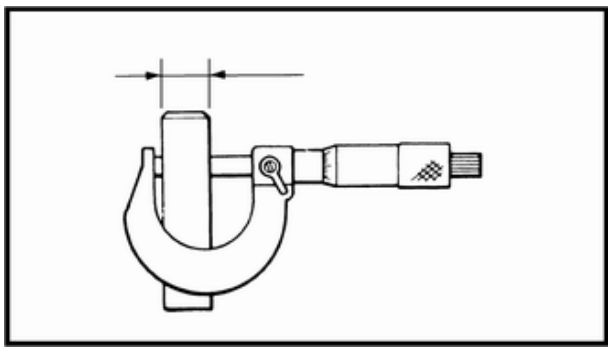
4. Mark or tag rocker arms and shafts to keep them in order for assembly.

5. Remove rocker shafts from seat by blade drive screw.

NOTE: Orientation of the rocker shafts is important for reassembly. Place only the exhaust rocker shaft into the exhaust side of the cam support.

6. Measure O.D. of rocker shafts for out--of --round.

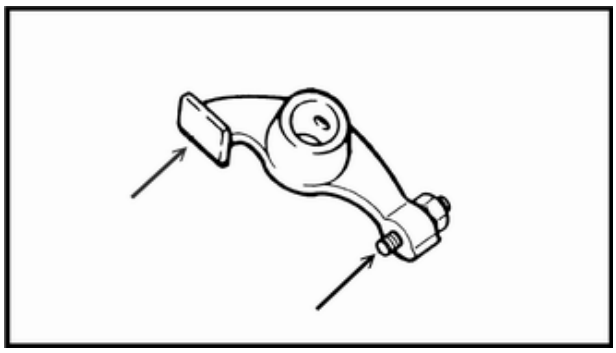
Inspect them for wear or damage. Replace if excessive wear is evident.



Rock Arm ID: 10.10mm
Rocker Arm OD: 9.91mm

7. Inspect each rocker arm cam follower surface. If there is any damage or uneven wear, replace the rocker arm.

NOTE: Always inspect camshaft lobe if rocker arms are worn or damaged.



8. Remove each rocker arm shaft using the 10 mm hex bolt that secures the lock plate.

NOTE: Placing the hex bolt in a vise and lightly tapping the rocker assembly with a non--marring hammer may be required to pull stuck rocker arm shafts.

9. Inspect rocker adjuster screws for wear, pitting, or damage to threads of the adjuster or locknut. Replace all worn or damaged parts.

NOTE: The end of the adjuster is hardened and cannot be ground or re-faced.

CAMSHAFT REMOVAL AND INSPECTION

NOTE: Cam chain tensioner must be removed before performing this procedure.

1. Remove the 4 cylinder head bolts evenly by loosening each one 1/4 turn at a time until loose.

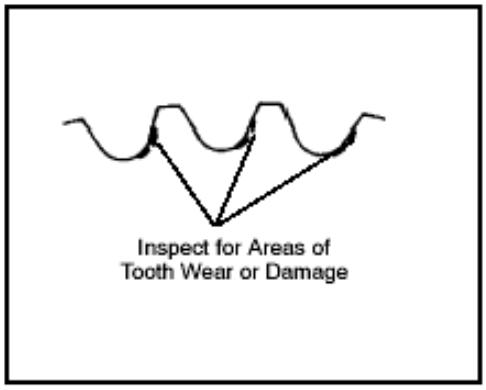
Tap the rocker assembly with a non—marring hammer to loosen the assembly.

2. Remove the cam chain from the sprocket by tilting the cam assembly and simultaneously lifting the chain.

3. If not removing the cylinder for other service, secure the cam chain with a wire to prevent it from falling into the crankcase.

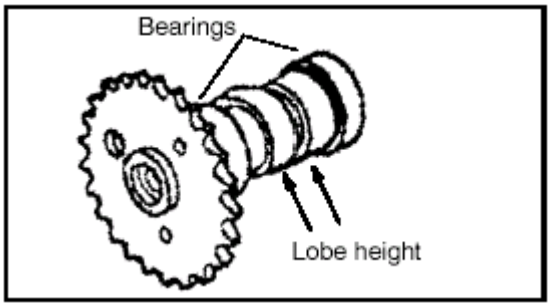
4. Inspect cam sprocket teeth for wear or damage.

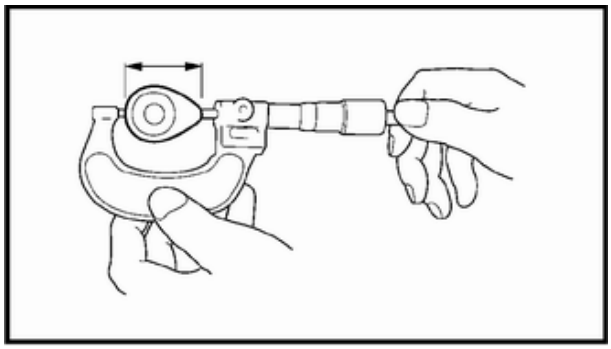
Replace if necessary.

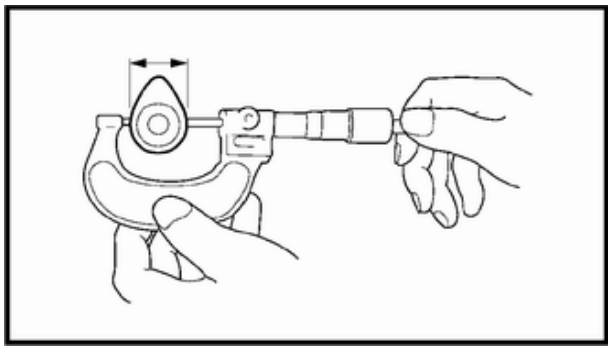


CAMSHAFT INSPECTION

1. Visually inspect each cam lobe and bearing for wear, chafing or damage.







Cam Lobe Dimension	Cam Lobe Dimension
Intake- Height	**Exhaust-Height**
Std: 35.64 mm	**Std: □35.64 mm**
Limit: 35.60 mm	**Limit: 35.60 mm**
Intake- width	**Exhaust-width**
Std: 29.15 mm	**Std: □29.15 mm**
Limit: 29.11 mm	**Limit: 29.11 mm**

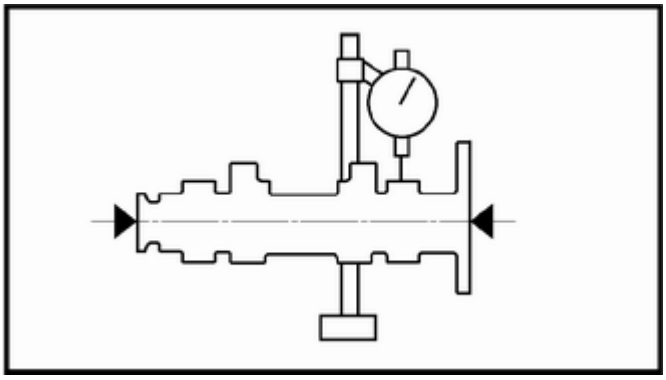
2. Thoroughly clean the cam shaft

3. Measure height of each cam lobe using a micrometer. Replace cam if worn below minimum height.

Replace camshaft if damaged or if any part is worn excessively.

4. Measure: camshaft run out

Replace camshaft if camshaft run out of specification.

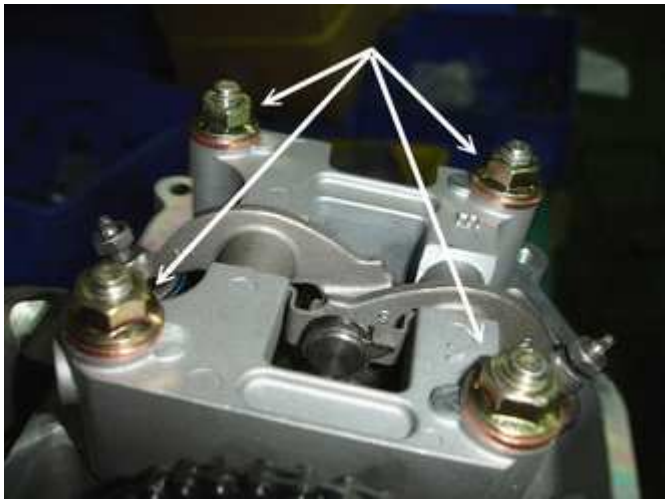


CYLINDER HEAD REMOVAL

NOTE: Cam chain and tensioner must be removed.

If no crankshaft service is being performed, secure cam chain with mechanics wire to avoid chain drop into the crankcase.

1. Loosen each of the four cylinder head nuts evenly 1/4 turn each time in a cross pattern until loose.



2. Remove the cylinder bolts and taps the cam support tower with a plastic hammer until loose.

3. After removing the camshaft and securing the cam chain, tap cylinder head lightly with a plastic hammer until loose.

CAUTION
Tap only in reinforced areas or on thick parts of cylinder head casting to avoid damaging casting.

4. Remove the thermostatic.

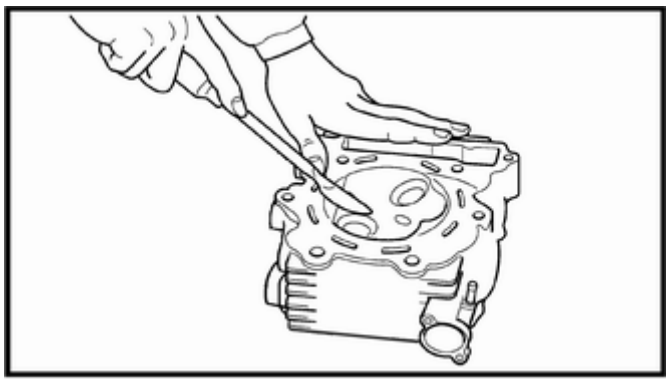
5. Remove intake manifold and throttle body from cylinder head.

6. Remove cylinder head and head gasket.

7. If not removing the cylinder for other service, secure the cam chain with a wire to prevent it from falling into the crankcase.

CYLINDER HEAD INSPECTION

1. Thoroughly clean cylinder head surface to remove all traces of gasket material and carbon.

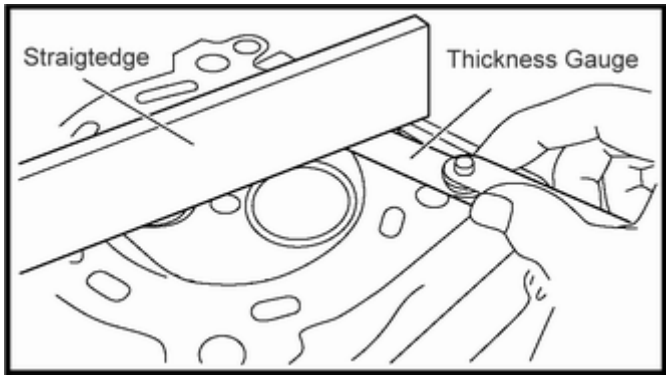


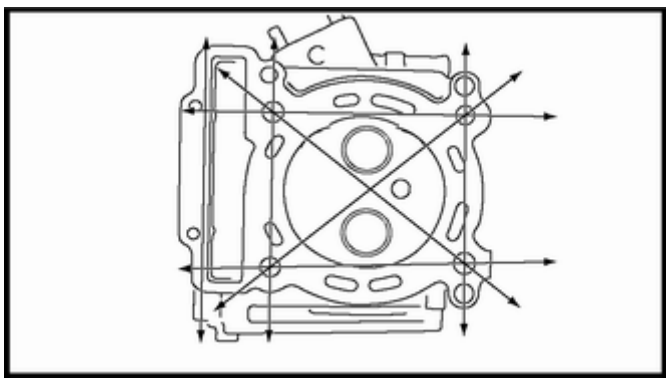
⚠ CAUTION

Use care not to damage sealing surface. If there is damage found on the cylinder head combustion chamber, it is recommended the component be replaced.

CYLINDER HEAD WARP INSPECTION

Lay a straight edge across the surface of the head at several different points and measure warp age by inserting a feeler gauge between the straight edge and the cylinder head surface.





ENGINE

CYLINDER HEAD DISASSEMBLY

⚠ WARNING

Wear eye protection or a face shield during cylinder head disassembly and reassembly.

NOTE: Keep all parts in order with respect to their location in the cylinder head.

NOTE: Valves have inner and outer springs.

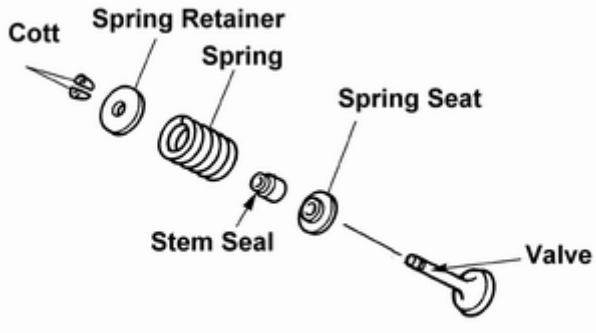
1. Using a valve spring compressor, compress the valve springs and remove the split keeper.

NOTE: To prevent loss of tension, do not compress the valve spring more than necessary.

2. Remove spring retainer and spring.

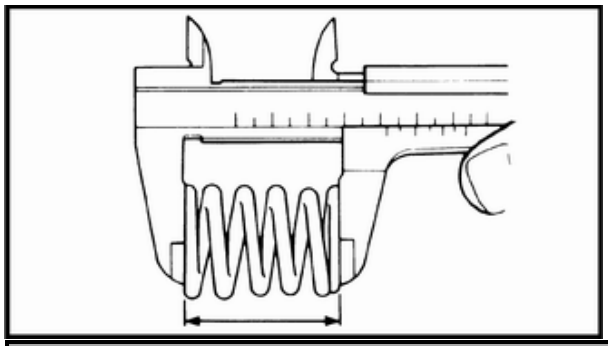
NOTE: The valve springs should be positioned with the tightly wound coils against the cylinder head on progressively wound springs.

3. Push valve out, keeping it in order for reassembly in the same guide.



Valve & Valve Spring Assembly

4. Measure free length of the inner and outer springs with a caliper.

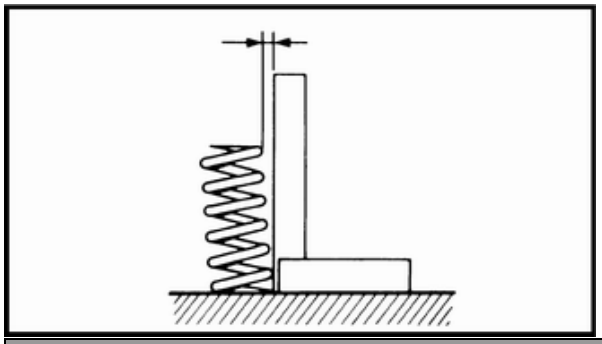


Valve Spring Free Length

Outer Spring Limit: 41.5mm

Inner Spring Limit: 31.3mm

5. Check spring for squareness as shown. Replace spring if measurements are out of specification.



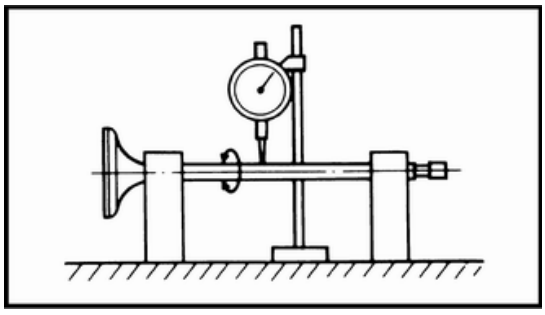
Valve Spring Tilt Limit

Both Spring Limit: 2.5°/ 1.5mm

NOTE: Replace seals whenever the cylinder head is disassembled. Hardened, cracked or worn valve seals will cause excessive oil consumption and carbon buildup.

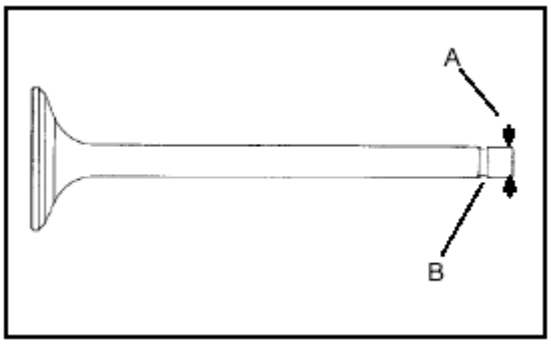
VALVE INSPECTION

1. Remove all carbon from valve with a soft wire wheel.
2. Check valve face for run out, pitting, and burnt spots.



3. To check for bent valve stems, mount valve in a drill or use "V" blocks and a dial indicator.

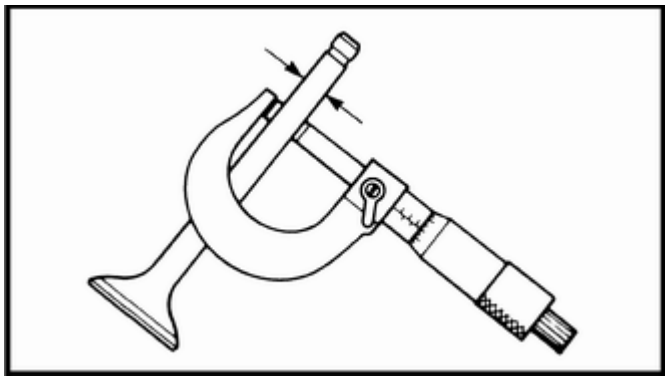
4. Check end of valve stem for flaring, pitting, wear or damage (A).



5. Inspect split keeper groove for wear or flaring of the keeper seat area (B).

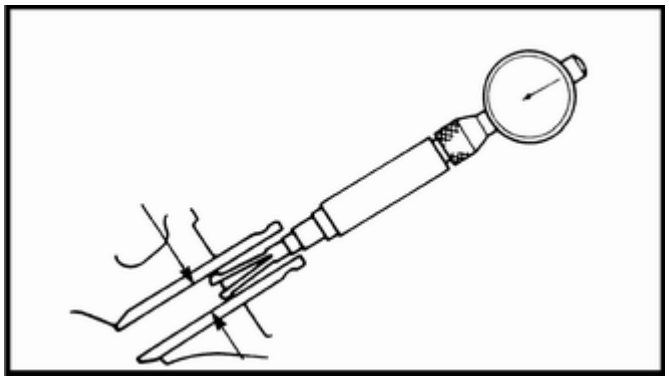
NOTE: The valves cannot be re-faced or end ground. They must be replaced if worn, bent, or damaged.

6. Measure diameter of valve stem with a micrometer in three places and in two different directions (six measurements total). Replace if excessive wear is evident.



Valve Stem OD LIMIT:
Intake Valve Limit: 4.975mm
Exhaust Valve Limit: 4.955mm

7. Measure valve guide inside diameter at the top middle and end of the guide using a small-hole gauge and a micrometer. Measure in two directions, front to back and side to side.



8. Subtract valve stem measurement to obtain stem to guide clearance.

Stem-to-guide clearance
Limit >: 0.10mm

NOTE: Be sure to measure each guide and valve combination individually.

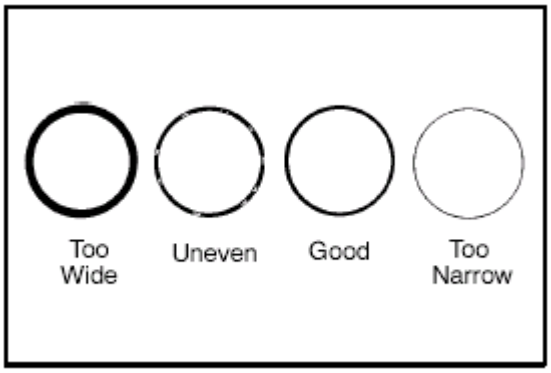
9. Replace valve and/or guide if clearance is excessive.

NOTE: If valve guides are replaced, valve seats must be reconditioned. Refer to Valve Seat Reconditioning for procedure.

VALVE SEAT RECONDITIONING

Valve Seat Inspection

Inspect valve seat in cylinder head for pitting, burnt spots, roughness, and uneven surface. If any of the above conditions exist, the valve seat must be reconditioned. *If the valve seat is cracked the cylinder head must be replaced.*



CYLINDER HEAD RECONDITIONING

NOTE: Servicing the valve guides and valve seats requires special tools and a thorough knowledge of reconditioning techniques. Follow the instructions provided in the Valve Seat Reconditioning Kit.

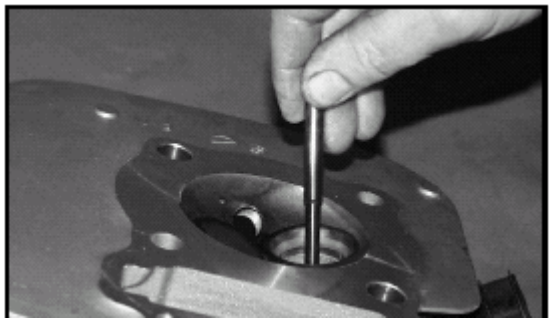
⚠ CAUTION

Wear eye protection when performing cylinder head service. Valve guide replacement will require heating of the cylinder head. Wear gloves to prevent burns.

Follow the manufacturers instructions provided with the valve seat cutters in the Valve Seat Reconditioning Kit. Abrasive stone seat reconditioning equipment can also be used. Keep valves in order with their respective seat.

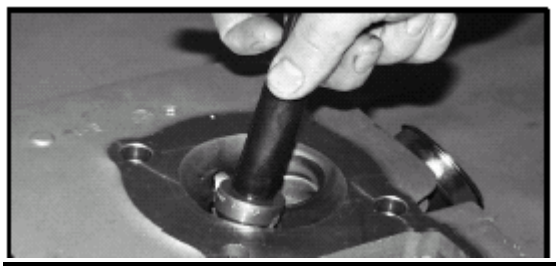
NOTE: Valve seat width and point of contact on the valve face is very important for proper sealing. The valve must contact the valve seat over the entire circumference of the seat, and the seat must be the proper width all the way around. If the seat is uneven, compression leakage will result. If the seat is too wide, seat pressure is reduced, causing carbon accumulation and possible compression loss. If the seat is too narrow, heat transfer from valve to seat is reduced and the valve may overheat and warp, resulting in burnt valves.

1. Install pilot into valve guide.



2. Apply cutting oil to valve seat and cutter.

3. Place 46° cutter on the pilot and make a light cut.



4. Inspect the cut area of the seat. If the contact area is less than 75% of the circumference of the seat, rotate the pilot 180° and make another light cut.

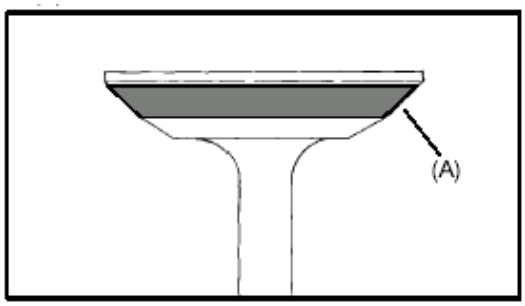
If the cutter now contacts the uncut portion of the seat, check the pilot. Look for burrs, nicks, or run out. If the pilot is bent it must be replaced.

If the contact area of the cutter is in the same place, the valve guide is distorted from improper installation and must be replaced. Be sure the cylinder head is at the proper temperature and replace the guide.

If the contact area of the initial cut is greater than 75%, continue to cut the seat until all pits are removed and a new seat surface is evident.

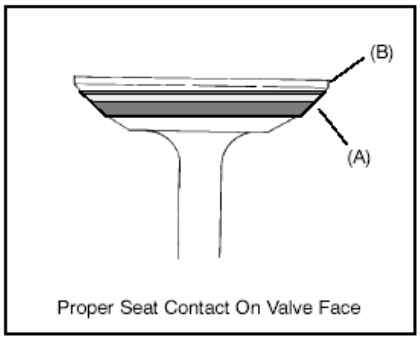
NOTE: Remove only the amount of material necessary to repair the seat surface.

5. To check the contact area of the seat on the valve face, apply a thin coating of Prussian Blue paste to the valve seat. If using an interference angle (46°) apply black marker to the entire valve face (A).



6. Insert valve into guide and tap valve lightly into place a few times.

7. Remove valve and check where the Prussian Built or black marker indicates seat contact on the valve face. The valve seat should contact the middle of the valve face or slightly above, and must be the proper width (A).



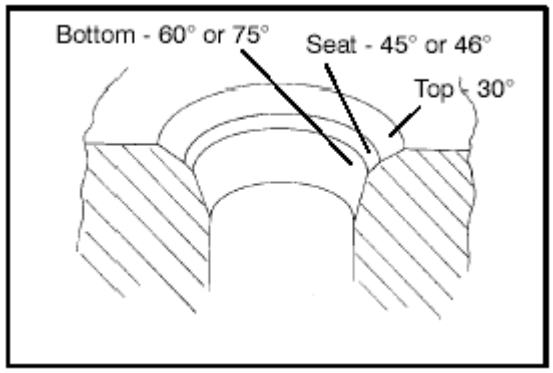
Proper Seat Contact On Valve Face

◎ If the indicated seat contact is at the top edge of the valve face and contacts the margin area(B) it is too high on the valve face. Use the 30° ・cutter to lower the valve seat.

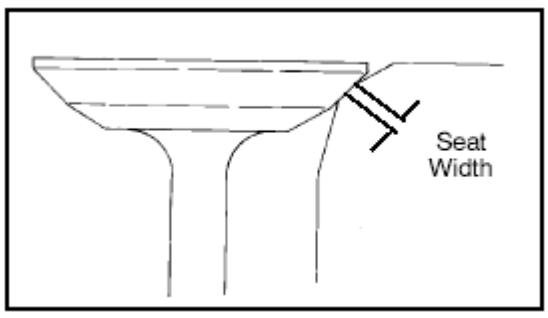
◎ If too low use the 60° ・or 75° ・cutter to raise the seat. When contact area is centered on the valve face, measure seat width.

◎ If the seat is too wide or uneven, use both top and bottom cutters to narrow the seat.

◎ If the seat is too narrow, widen using the 45° ・cutter and re-check contact point on the valve face and seat width after each cut.



NOTE: When using an interference angle, the seat contact point on the valve will be very narrow, and is a normal condition. Look for an even and continuous contact point on the black marker, all the way around the valve face.



8. Clean all filings from the area with hot soapy water, rinse, and dry with compressed air.

9. Lubricate the valve guides with clean engine oil, and apply oil or water based lapping compound to the face of the valve. Lapping is not required with an interference angle.

10. Insert the valve into its respective guide and lap using a lapping tool or a section of fuel line connected to the valve stem.

11. Rotate the valve rapidly back and forth until the cut sounds smooth. Lift the valve slightly off of the seat, rotate 1/4 turn, and repeat the lapping process. Do this four to five times until the valve is fully seated, and repeat process for the other valve.

12. Clean cylinder head, valves, and camshaft oil supply passages thoroughly.

13. Spray electrical contact cleaner into oil passages and dry using compressed air.

CYLINDER HEAD ASSEMBLY

⚠ CAUTION

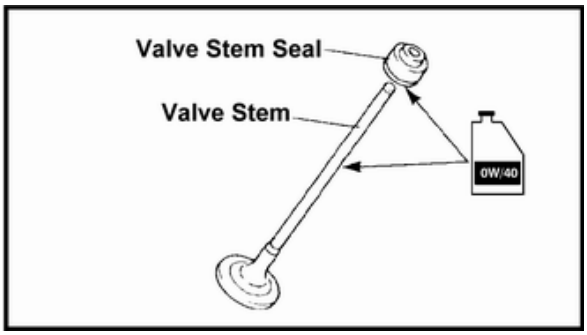
Wear eye protection during assembly.

NOTE: Assemble the valves one at a time to maintain proper order.

1. Install new valve seals on valve guides.

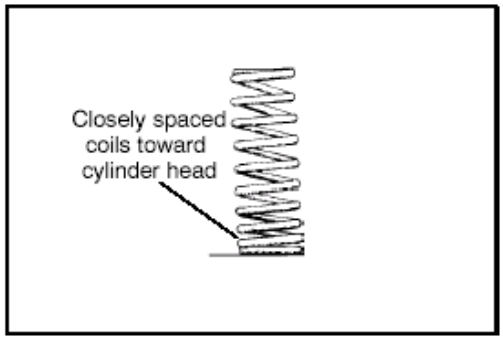
2. Apply engine oil to valve guides and seats.

3. Coat valve stem with molybdenum disulfide grease.



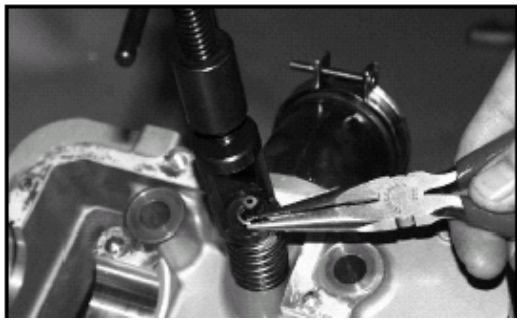
4. Install valve carefully with a rotating motion to avoid damaging valve seal.

5. Dip valve spring and retainer in clean engine oil and install spring with closely spaced coils toward the cylinder head.



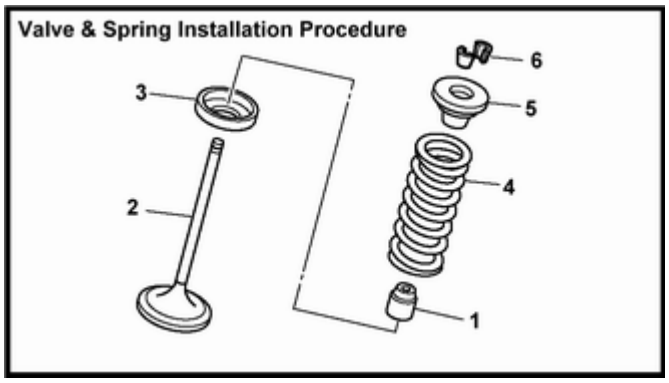
6. Place retainer on spring and install valve spring

7. Use compressor to compress spring only enough to allow split keeper installation to prevent loss of spring tension. Install split keepers with the gap even on both sides.



7. Repeat procedure for remaining another valve.

8. When all valves are installed, tap lightly with soft-faced hammer on the end of the valves to seat the split keepers.

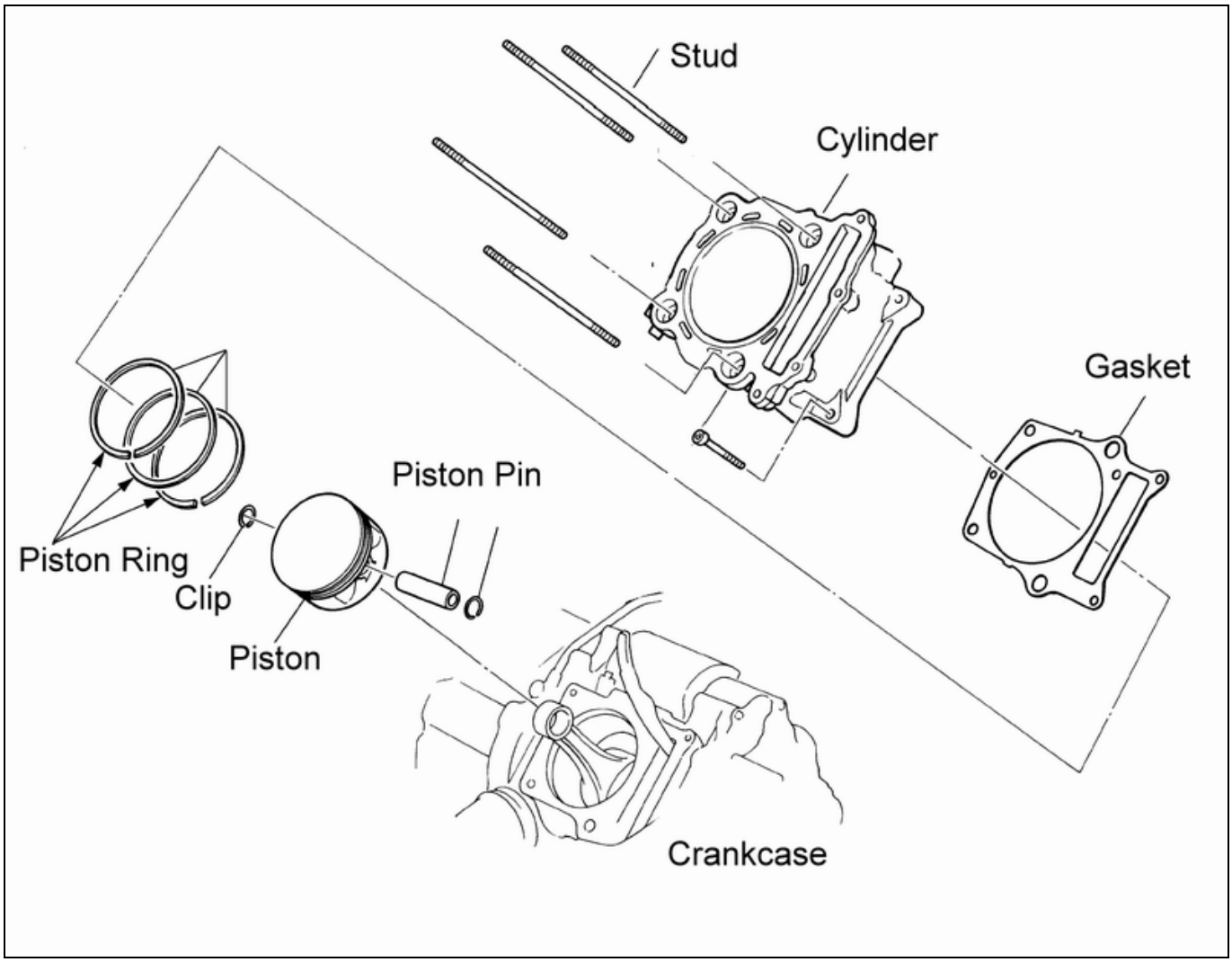


VALVE SEALING TEST

1. Clean and dry the combustion chamber area.

2. Pour a small amount of cleaning solvent into each port and check for leakage around each valve.

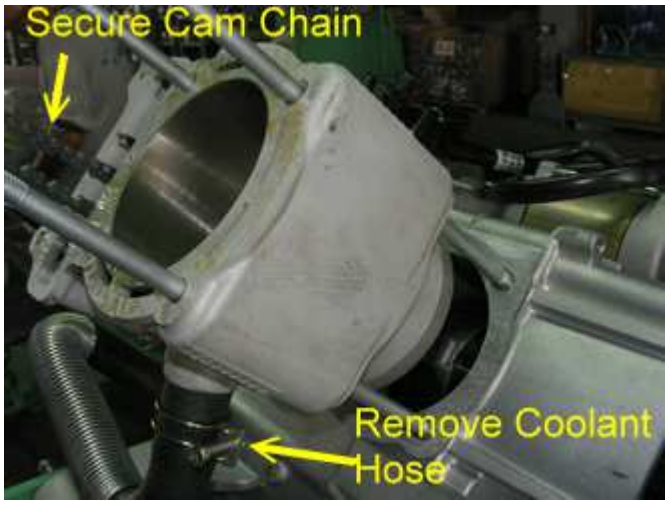
The valve seats should hold fluid with no seepage.



CYLINDER REMOVAL

Follow engine disassembly procedures to remove valve cover, camshaft and rocker arms, and cylinder head.

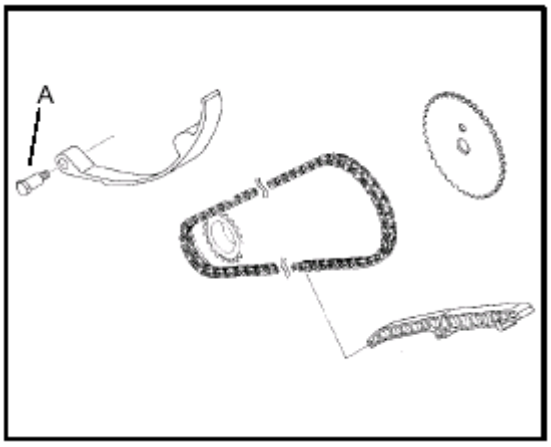
1. Remove cam chain guide at front of cylinder.
2. Remove the two 6 mm cylinder base bolts.
3. Remove coolant tube from cylinder.
4. Tap cylinder lightly with a plastic hammer in reinforced areas only until loose.
5. Rock cylinder forward and backward and lift it from the crankcase, supporting piston and connecting rod. Support piston with Piston Support Block.



ENGINE

CAM CHAIN FOLLOWER / TENSIONER BLADES

1. Remove bolt securing tensioner blade to crankcase A.



2. Remove blades and inspect for cracks, wear, or damage.

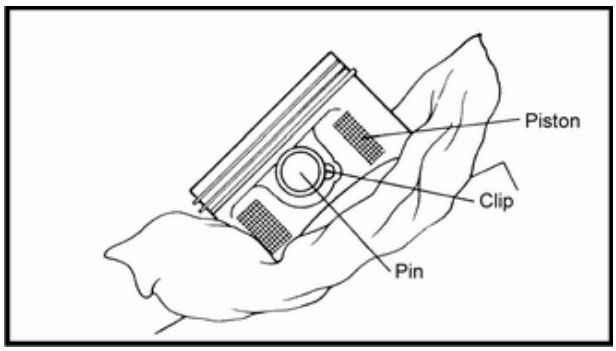
PISTON REMOVAL

1. Remove cir-clip. Note that opening for cir-clip access is on the exhaust side.

2. Remove piston cir-clip and push piston pin out of piston. If necessary, heat the crown of the piston *slightly* with a propane torch.

⚠ CAUTION

Do not apply heat to the piston rings. The ring may lose radial tension.



3. Remove the compression rings, starting with the top ring.

***Using piston ring pliers**: Carefully expand ring and lift it off the piston.

4. When removing a piston ring, open the end gap with your fingers and lift the other side of the ring over the piston crown.

⚠ CAUTION

Do not expand the ring more than the amount necessary to remove it from the piston, or the ring may break.

***By hand:** Placing both thumbs as shown, spread the ring open and pushes up on the opposite side. Use care to not scratch the ring lands.

5. Repeat procedure for second ring.

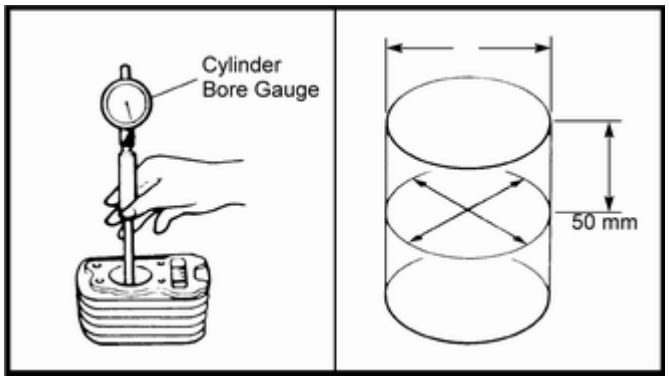
6. The oil control ring is a three-piece design consisting of a top and bottom steel rail and a center expander section. Remove the top rail first followed by the bottom rail and expander.

CYLINDER INSPECTION

1. Remove all gasket material from the cylinder sealing surfaces.

2. Inspect the top of the cylinder for warp gage using a straight edge and feeler gauge.

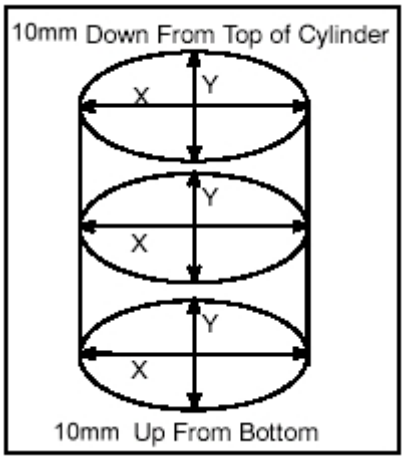
Cylinder Warp:
0.05 mm MAX



Cylinder Bore standard:
78.00~78.01mm
Cylinder Bore limit:
78.05mm

3. Inspect cylinder for wear, scratches, or damage.

4. Inspect cylinder for taper and out of round with a telescoping gauge or a dial bore gauge. Measure in two different directions, front to back and side to side, on three different levels (10mm□down from top, in the middle, and 10mm□up from bottom).



5. Record measurements. If cylinder is tapered or out of round beyond specification, the cylinder must be honed, bored, or replaced.

Cylinder Taper
Limit: 0.05mm Max.
Cylinder Out of Round
Limit: 0.05mm Max.

CYLINDER HONE SELECTION / HONING PROCEDURE

⚠ CAUTION

A hone, which will straighten as well as remove material from the cylinder, is very important. Using a common spring loaded glaze breaker for honing is not advised. Polaris recommends using a rigid hone or arbor-honing machine. Cylinders may be wet or dry honed depending upon the hone manufacturer's recommendations. Wet honing removes more material faster and leaves a more distinct pattern in the bore.

HONING TO DEGLAZE

A finished cylinder should have a crosshatch pattern to ensure piston ring seating and to aid in the retention of the fuel/oil mixture during initial break in. Hone cylinder according to hone manufacturer's instructions, or these guidelines:

◎ Use a motor speed of approximately 300-500 RPM, run the hone in and out of the cylinder rapidly until cutting tension decreases. Remember to keep the hone drive shaft centered (or cylinder centered on arbor) and to bring the stones approximately・1.3 cm above and below the bore at the end of each stroke.

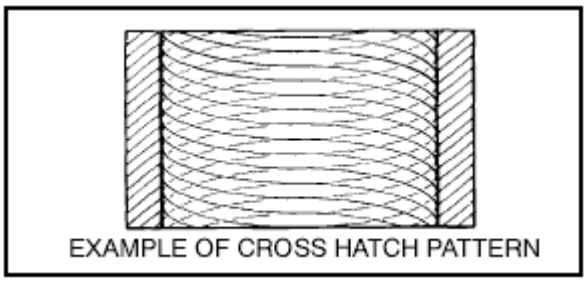
◎ Release the hone at regular intervals and inspect the bore to determine if it has been sufficiently deglazed, and to check for correct cross--hatch.

NOTE: **Do not allow cylinder to heat up during honing**.

◎ After honing has been completed, inspect cylinder for thinning or peeling.

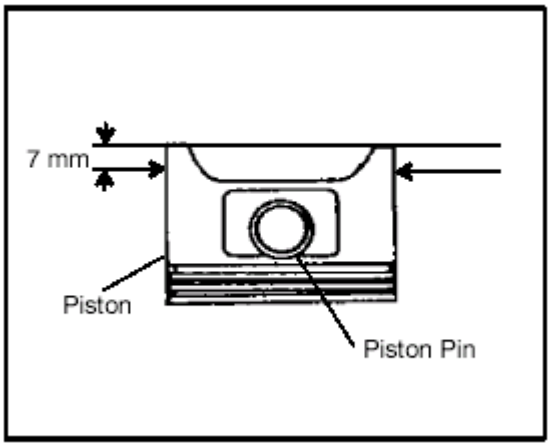
IMPORTANT: Clean the Cylinder After Honing

It is very important that the cylinder be thoroughly cleaned after honing to remove all grit material. Wash the cylinder in a solvent, then in hot, soapy water. Use electrical contact cleaner if necessary to clean these areas. Rinse thoroughly, dry with compressed air, and oil the bore immediately with 4 Cycle Lubricant to prevent the formation of surface rust. If cylinder wears or damage is excessive, it will be necessary to replace the cylinder. Hone only enough to deglaze the outer layer of the cylinder bore.



PISTON INSPECTION

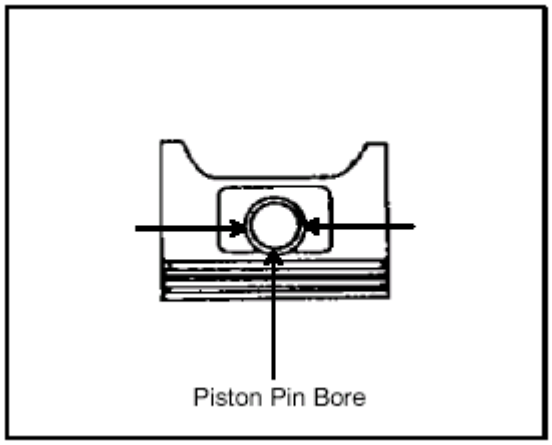
1. Measure piston outside diameter at a point 7mm up from the bottom of the piston at a right angle to the direction of the piston pin.



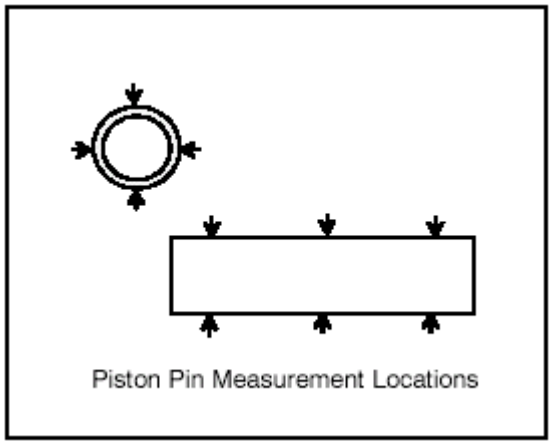
2. Subtract this measurement from the maximum cylinder measurement obtained earlier.

Piston to Cylinder Clearance
Std: 0.02-0.05 mm
Limit: 0.1 mm

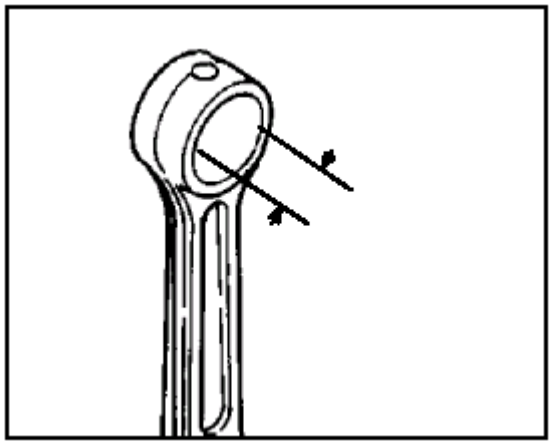
3. Measure piston pin bore. Replace piston if out--of--round



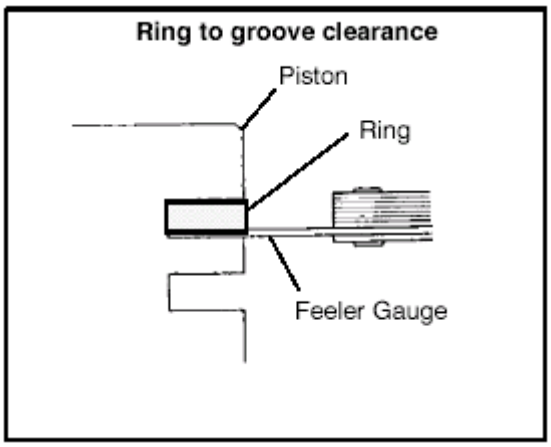
4. Measure piston pin O.D. Replace piston pin if out--of--round.



5. Measure connecting rod small end ID. Replace crankshaft if out--of--round.

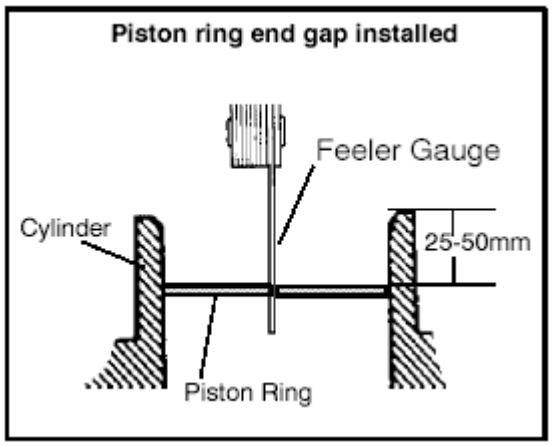


6. Measure piston ring to groove clearance by placing the ring in the ring land and measuring with a thickness gauge. Replace piston and rings if ring-to-groove clearance exceeds service limits.



PISTON RING INSTALLED GAP

1. Place each piston ring inside cylinder using piston to push ring squarely into place as shown.



Piston Ring Installed Gap		
Top Ring	**Second Ring**	**Oil Ring**
Std: 0.1-0.3 mm	**Std: 0.35-0.5 mm**	**Std: 0.2-0.7 mm**
Limit: 0.8 mm	**Limit: 1.0 mm**	**Limit: 1.5 mm**

2. Measure the gap with a feeler gauge at both the top and bottom of the cylinder.

NOTE: Measure at two points in the cylinder

A difference in end gap indicates cylinder taper.

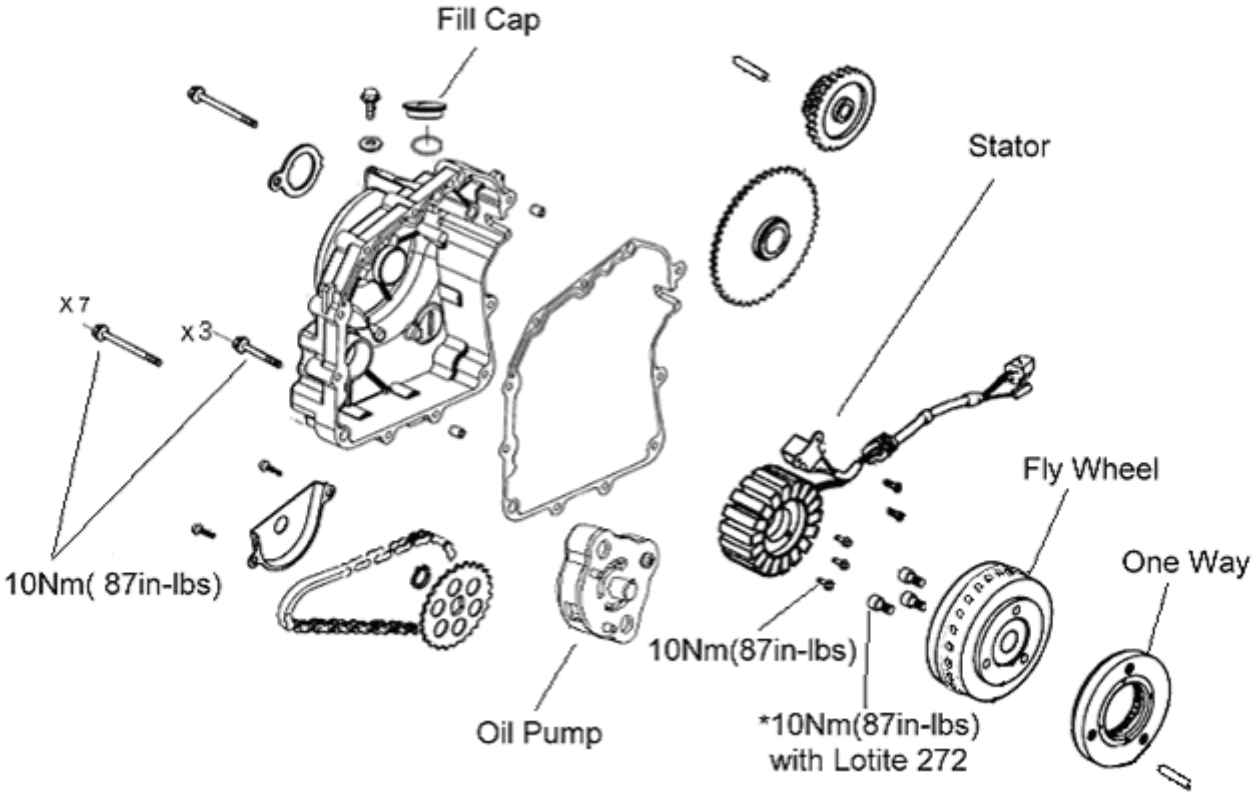
The cylinder should be measured for excessive taper and out of round.

3. If the installed gap measurement exceeds the limit, replace the rings. If using new rings and the measurement is too small, file the ring ends to achieve the proper gap.

NOTE: Always check piston ring installed gap after re-boring a cylinder or when installing new rings. A re-bored cylinder should always be scrubbed thoroughly with hot soapy water, rinsed, and dried completely. Wipe cylinder bore with an oil rag immediately to remove residue and prevent rust.

ENGINE

ALTERNATOR / STATOR / OIL PUMP EXPLODED VIEW



STARTER DRIVE GEAR REMOVAL / INSPECTION

1.Remove water pump tube.

2.Take off water pump bolts.

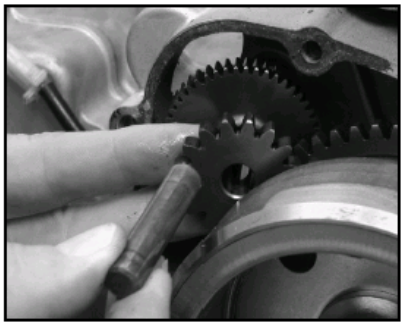
3.Tap water pump lightly with a plastic hammer in reinforced areas only until loose.

4.Remove stator housing bolts and removes housing.

5.Remove the start drive gear and shaft by pulling the shaft and tilting the gear slightly. Flywheel removal generally is not required.

6.Measure the OD of the starter drive shaft on both ends for out--of--round.

7.Measure the ID of the bushing in the stator housing (A) and in the crankcase (B) in two directions 90° ・apart to determine if out--of--round. Calculate clearance. Replace components if clearance is excessive.



ENGINE
FLYWHEEL REMOVAL / INSPECTION

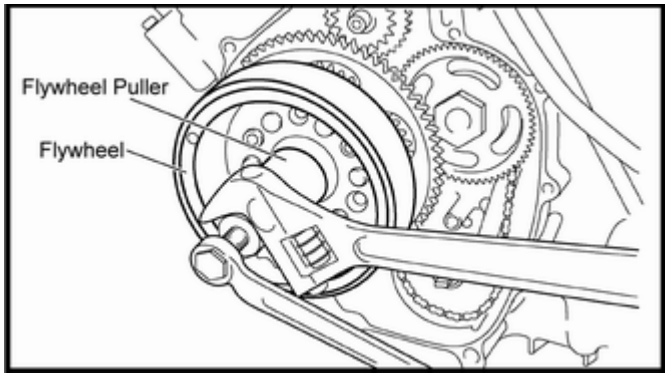
CAUTION

The crankshaft end contains an oil passage plunge joint (A) as shown below. The plunger must be able to move in and out freely. Avoid damage to the crankshaft end or plunge joint and spring, which can cause loss of oil pressure, resulting in severe engine damage.

1. Remove the oil passage plunge joint, flywheel nut and washer.

2. Install Flywheel Puller.

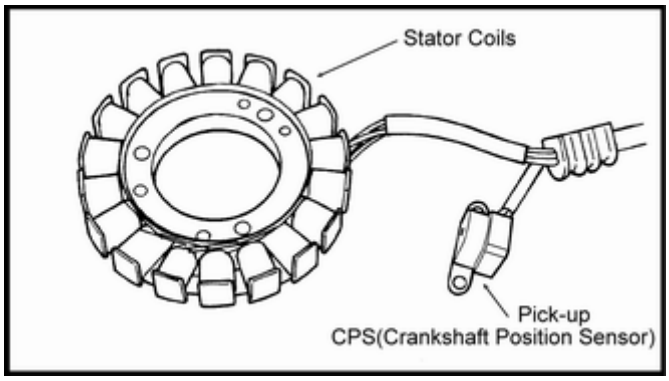
3. Remove flywheel.



CAUTION

Do not hammer or strike the tool while attached to the crankshaft end, which may become damaged.

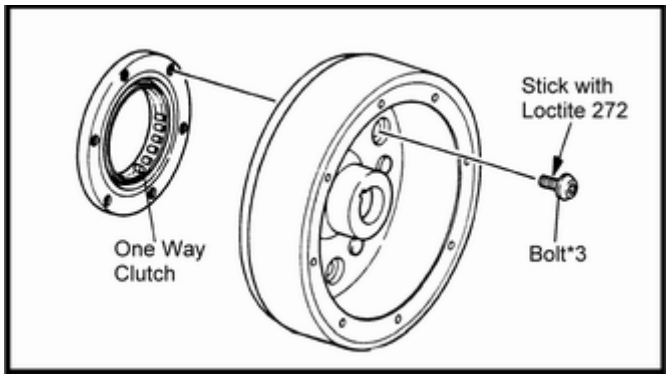
4. Remove stator coil and pick up from right hand crank cover.



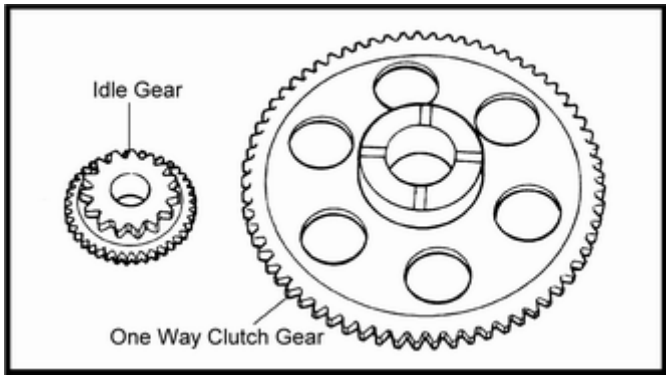
5. Inspect stator coils and pick up. Replace complete stator if any one coil or pick up burnt.

ONE-WAY CLUTCH REMOVAL / INSPECTION

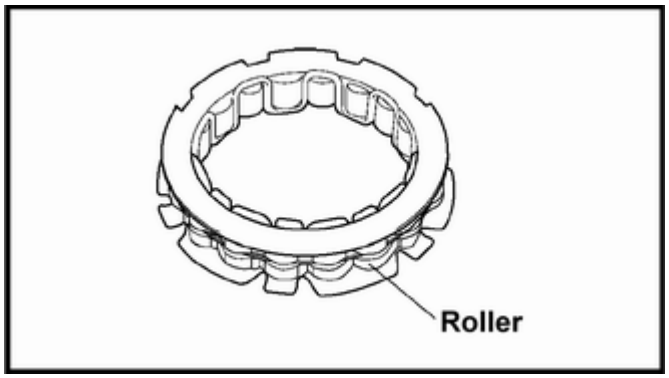
1. Remove the hex bolts that attach the one—way drive clutch to the flywheel.



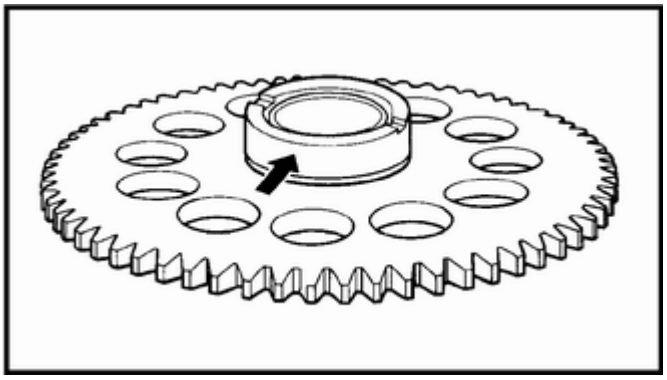
2. Inspect the one-way clutch gear contact surfaces and drive teeth for signs of wear or gouging. Replace the one-way clutch as an assembly if it is not working properly.



3. Inspect one-way rollers connect surface. Replace one-way roller if it worn or damaged.



4. Inspect one-way clutch gear connect surface against with one-way roller. Replace one-way clutch gear if it worn or damaged.



5. Install the one-way clutch onto flywheel and push the one-way gear into one-way clutch.

6. Turn the one-way gear counterclockwise to check that the one-way clutch and one-way gear well engagement.

7. If the one-way clutch and one-way gear do not engagement, replace the starter clutch.

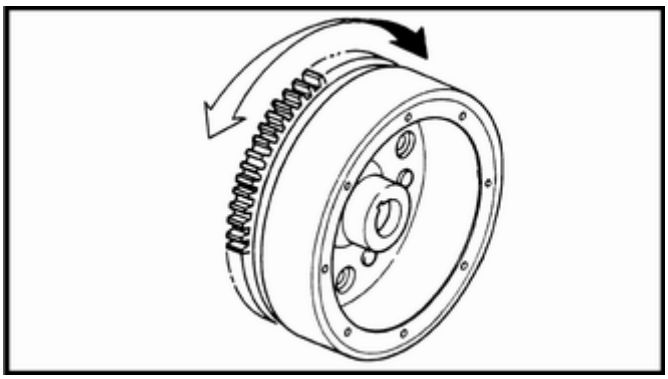
8. Turn the one-way gear clockwise to check the one-way gear for smooth operation.

9. If operation is not smooth, replace the one-way clutch.

NOTE: One-way clutch components are not serviceable. Replace the component as an assembly.

10. To reattach the one way assembly, **apply Loctitet 272** to the retaining screw threads.

Torque to specification.

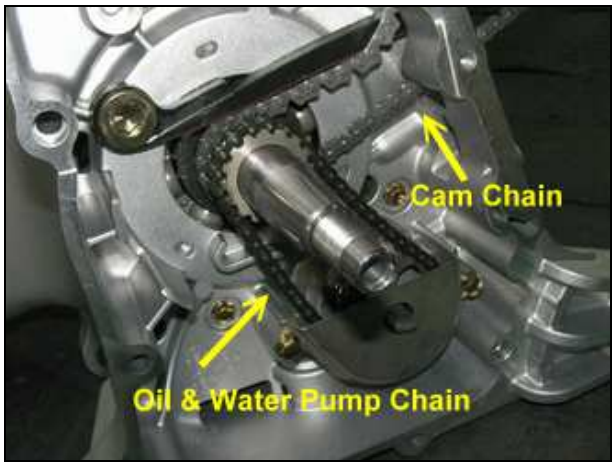


One-Way Clutch Screw Torque: 10 Nm

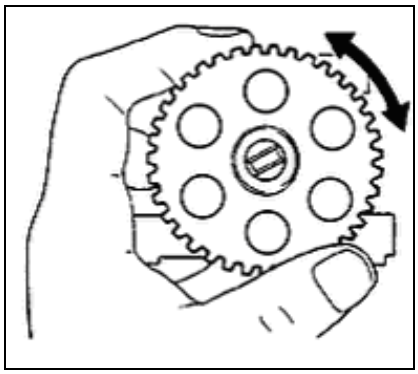
OIL PUMP DRIVE SPROCKET REMOVAL / INSPECTION

1. Remove the oil pump shield.

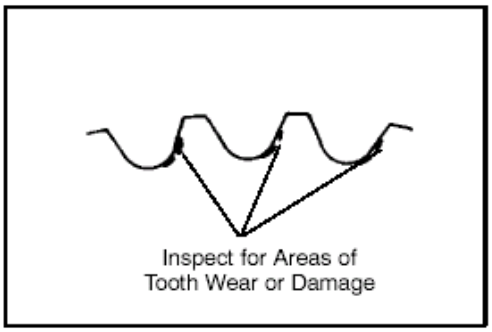
2.The outer chain is oil and water pump drive chain. The inner chain is cam chain.



3. Inspect oil sprocket rough movement? Replace sprocket if rough movement.

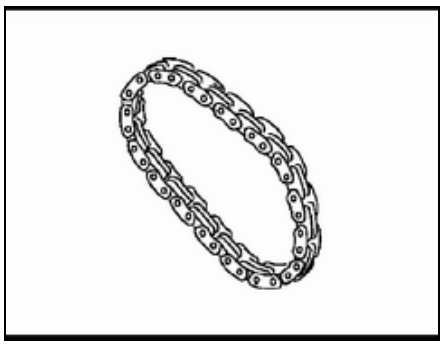


4. Inspect sprocket teeth for wear or damage.



5. Replace any worn or damaged parts.

6. Inspect the chain for worn, damage or missing rollers. Replace chain anytime the oil pump is replaced or if excessively worn.

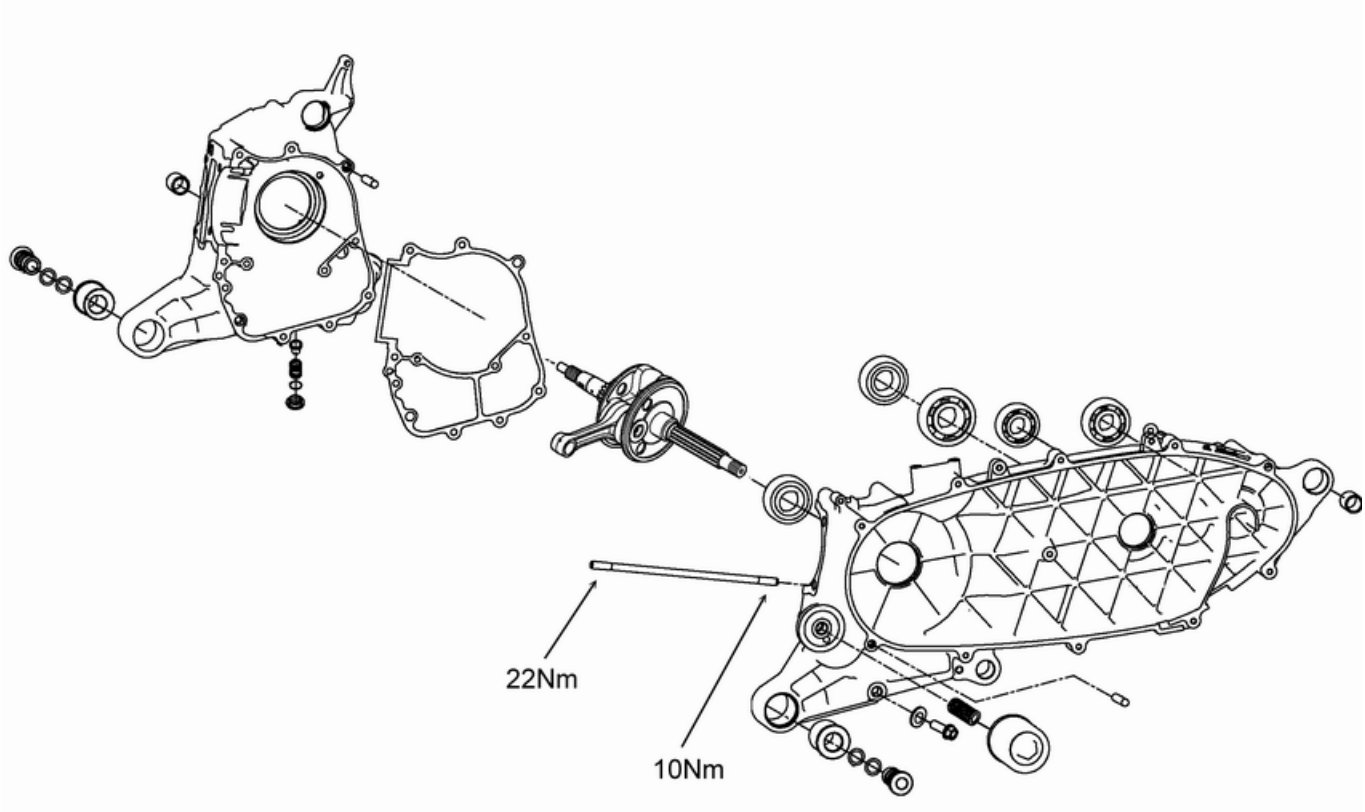


OIL PUMP REMOVAL

1. Remove the oil pump retaining screws.

2. When install oil pump inner roller which the cover arrow must align the dot as above shows.

NOTE: Oil pump is not a serviceable assembly. Replace completed oil pump if excessively worn.



CRANKCASE DISASSEMBLY

NOTE: Engine must be removed from the frame to perform any crankcase or crankshaft removal.

NOTE: The starter, starter drive, flywheel, stator, oil pump and transmission can be serviced with the engine in the frame.

CRANKCASE SEPARATION AND CAM CHAIN REMOVAL

NOTE: Stator housing, flywheel and gears have are previously removed for this procedure. Use care during the removal process to avoid damage to the cam chain.

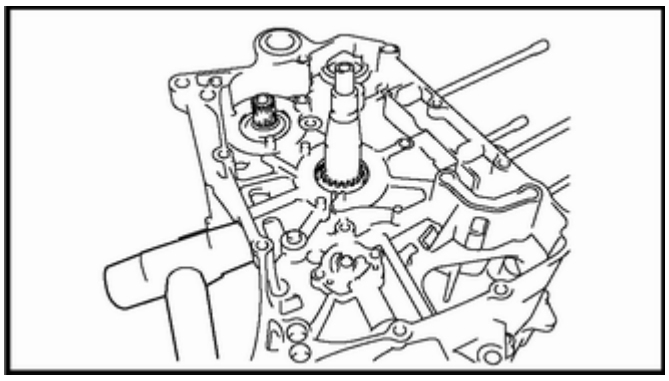
NOTE: Valve train and cylinder removal must be performed prior to this procedure.

NOTE: Always replace the pto crankshaft seal after performing this procedure.

1. Remove 3 flange bolts (yellow arrows) from the right side crankcase.

2. Separate crankcase using a hydraulic tool or by pressing on the pto end of the crankshaft using special tool.

NOTE: Tap on one side of the crankcase with a soft-face hammer. Tap only on reinforced portions of the crankcase, not on the crankcase mating surfaces. Work slowly and carefully and make sure the crankcase halves separate evenly.



3. Watch the gap along the crankcase mating surface and separate the crankcase evenly.

4. Once the crankshaft bearing is free from the case, the crankshaft and cam chain can be removed by hand for service.

CRANKSHAFT REMOVAL

1. Remove right hand crankcase with soft-faced hammer.

2. Press the crankshaft out. Use care not to damage the crankshaft oil passage on the right end crankshaft end.

NOTE: Use care not to damage the crankshaft end.

CRANKSHAFT / CAM & OIL CHAIN / SPROCKET INSPECTION

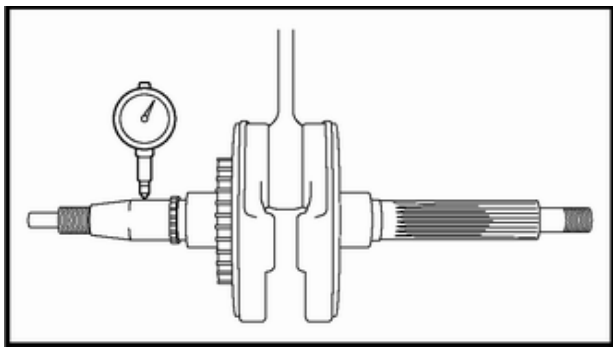
1. Inspect the crankshaft main bearings and cam and oil pump chain sprocket for wear or damage.

NOTE: Due to extremely close tolerances and minimal wear, the bearings must be inspected visually, and by feel. Look for signs of discoloration, scoring or galling. Turn the outer race of each bearing.

The bearings should turn smoothly and quietly. The inner race of each bearing should fit tightly in the crankshaft. The outer race should be firm with minimal side-to-side movement and no detectable up and down movement.

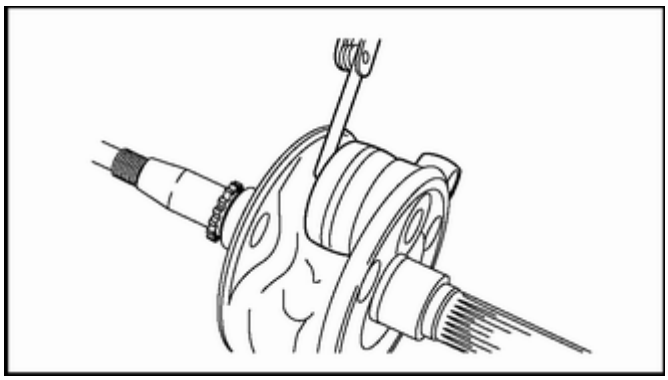
2. Replace the crankshaft if the components fail visual inspection.

3. Measure crankshaft run out, Replace crankshaft and both bearings if out of specification.



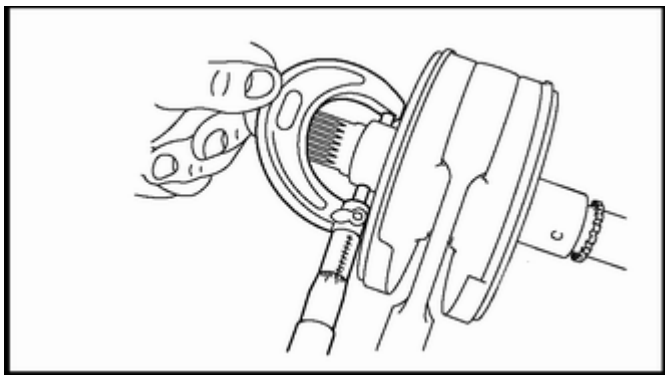
Maximum crankshaft run out
0.05mm

4. The connecting rod utilizes a roller bearing. Clearance is minimal and cannot be measured. Visually inspect bearing journal for scoring, damage or excessive wear. Replace crankshaft if it fails visual inspection.

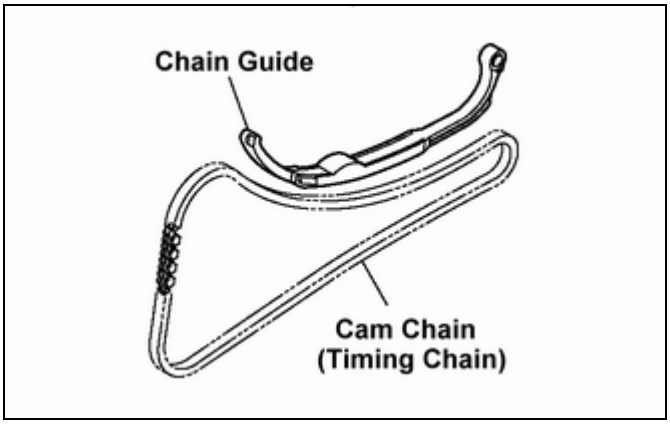


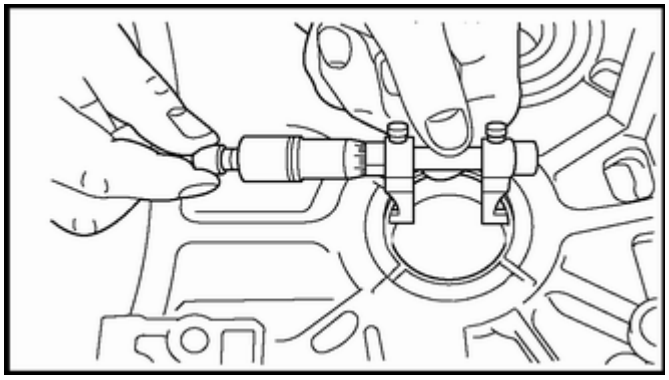
5. Inspect the clearance of connecting rod big end and flywheel by feeling gauge. If clearance is excessive replace the crankshaft assembly.

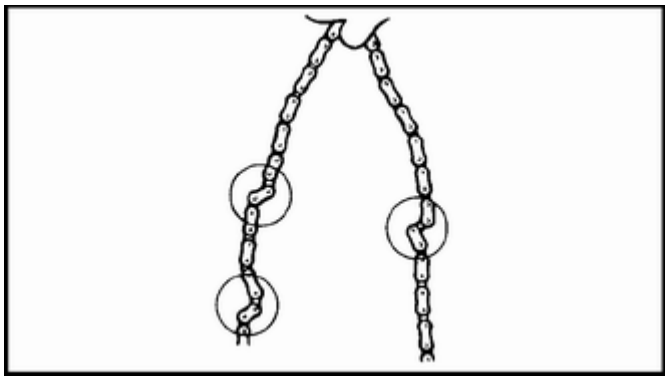
Connecting rod clearance limit:
0.5 mm



6. Inspect chain for worn or missing rollers or damage. Replace if worn excessively or as part of any crankshaft repair.







CRANKCASE OIL STRAINER INSPECTION

1. Remove drain plug.

2. Remove oil strainer and visually inspect for any rips, tears or obstructions in screen.

3. Replace oil strainer if it fails visual inspection.

CRANKCASE INSPECTION

NOTE: Removal and installation of new seals is recommended anytime the crankcase is disassembled.

1. Inspect both the crankshaft and the crankcase diameter where bearing is installed location. Replace crankshaft if it is out of specification.

BEARING / SEAL INSTALLATION

NOTE: To ease crankcase-bearing installation, warm the crankcase until hot to the touch. Placing the bearing in a freezer prior to installation will assist the assembly process.

1. Install the bearing so the numbers are visible.

2. Drive or press the new bearing into the crankcase, using the proper driver.

CAUTION
Press only on outer race of bearing to prevent bearing damage.

3. Install new seals with the lip facing in.

CAUTION
Press only on outer diameter to prevent damage.

CRANKSHAFT AND CAM / OIL CHAIN INSTALLATION

Lubricate all bearings with clean engine oil before assembly.

1. Support the crankcase on blocks.

2. Install the PTO end of the crankshaft onto crankcase.

NOTE: Use care not to damage the crankshaft end.

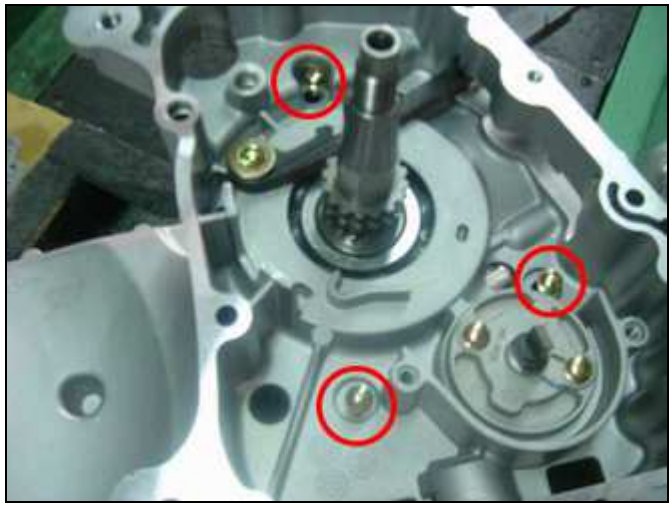
⚠ WARNING

The balance flat must square with crankshaft PTO end.

3. Install a new gasket onto the right hand crankcase half. Applying a thin amount of crankcase sealer to the gasket will help hold it in place.

4. Install 3 bolts (circled) from the right side crankcase.

NOTE: Use care not to damage the crankshaft end.



Crankcase Bolt Torque:
10 Nm (87 in-lbs)

5. Loop the cam chain through the chain room and secure with mechanic's wire.

ENGINE

OIL PUMP AND CHAIN INSTALLATION

NOTE: Oil pump is not a serviceable assembly. Do not disassemble pump. Replace entire component.

1. Inspect the oil pump sealing surface on the crankcase. Apply a liberal amount of engine oil to the surfaces and pump.

2. Install oil pump as shown. Torque screws to specified torque.

Oil Pump Cover Screw Torque: 8 Nm

3. Install chain on oil pump and crankshaft sprocket then place oil pump sprocket into oil pump shaft

4. Install the cir-clip into oil pump shaft.

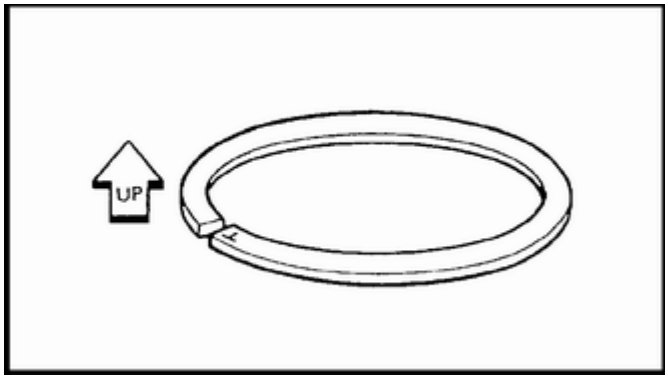
5. Install oil pump shield.

NOTE: Do not use gasket sealer on the pump mating surfaces.

PISTON RING INSTALLATION

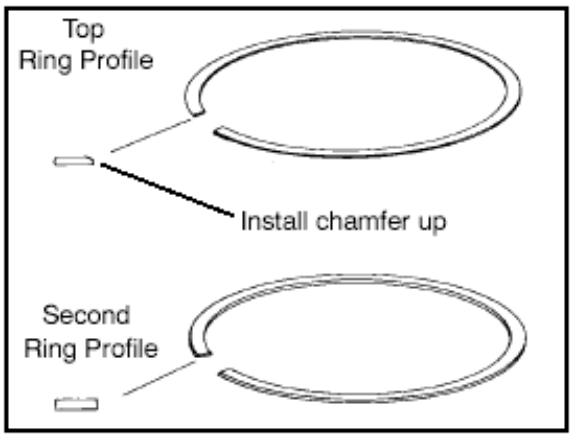
NOTE: Apply clean engine oil to all ring surfaces and ring lands. Always check piston ring installed gap before rings are installed on piston. If the piston has been in service, clean any accumulated carbon from the ring grooves and oil control ring holes.

1. Place the oil control ring expander in oil ring groove with the end gap facing forward. The expander has no up or down marking and can be installed either way. The ends should butt squarely together and must not overlap.



2. Install the oil ring top rail with the end gap at least 30˚ ・from the end of the expander.

3. Install the bottom rail with the gap at least 30□□from the end of the expander on the side opposite the top rail gap.

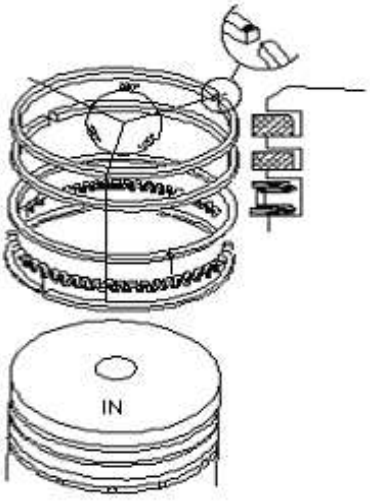


4. Install the second ring with the mark facing up.
Position the end gap toward the rear (intake) side of the piston.
5. Install the top ring with the chamfered edge facing up.
6. Check to make sure the rings rotate freely in the groove when compressed by hand.

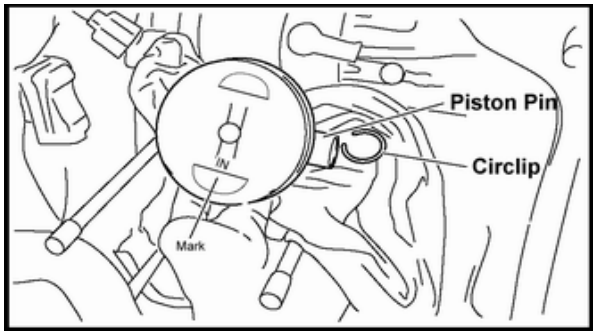
PISTON INSTALLATION

CAUTION: Do not re-use cir-clips. Cir-clips become deformed during the removal process. Do not compress the new clip more than necessary to prevent loss of radial tension. Severe engine damage may result if cir-clips are re-used or deformed during installation.

1. Install a new cir-clip on one side of the piston with the end gap facing *up* or *down*.
2. Apply clean engine oil to the piston rings, ring lands, piston pin bore, piston pin, and piston skirt.
Lubricate the connecting rod (both ends) and crankshaft main bearing area.
3. IMPORTANT-- Install the piston on the connecting rod with the ’IN” casting mark facing the intake side of engine. The piston pin should be a push fit into the piston.
4. Install the other cir-clip with the gap facing up or down. (See Caution with Step 3 above). Push the piston pin in both directions to make sure the clips are properly seated in the groove.



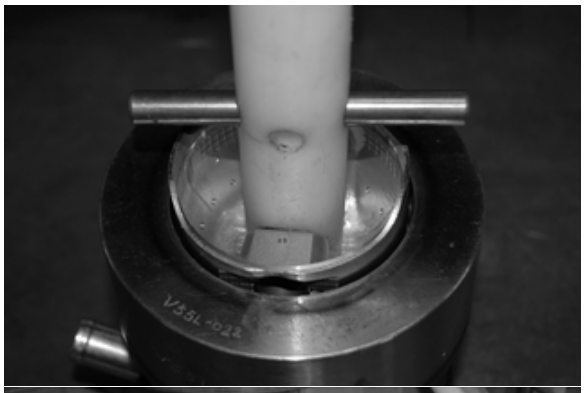
5. Place the dowel pins in the crankcase and install a new cylinder base gasket.
6. Lubricate the piston and rings with assembly lube and install a ring compressor on the piston assembly. Verify that the ring gaps are 120° apart from each other before installation.
7. Push the rings into the taper using a metallic, blunt--edge tool while holding the cylinder down.
This will help push the piston past the ring taper into the cylinder.



8. Up-side-down cylinder then place the blunt--edge tool on cylinder. Align it with cylinder.

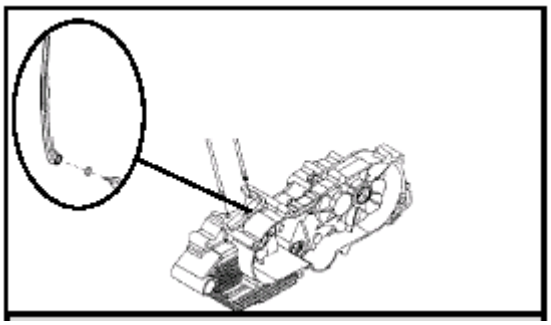
9. Place piston into blunt--edge tool.

10. Use non-metallic rod to push piston until piston through the tool to cylinder.



TENSIONER BLADE INSTALLATION

1. Install the tensioner blade and tighten the mounting bolt to specified torque.



Tensioner Blade Mounting Bolt Torque: 10 Nm (7.4 ft. lbs.)

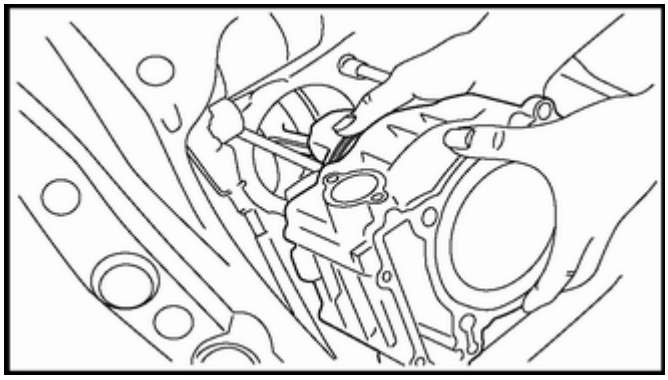
CYLINDER INSTALLATION

NOTE: Clean the gasket surfaces on the crankcase and cylinder. Remove all traces of old gasket material and apply a new base gasket

1. Install the dowel pin(s). Install an new base gasket onto the mating surface and install the piston into cylinder.

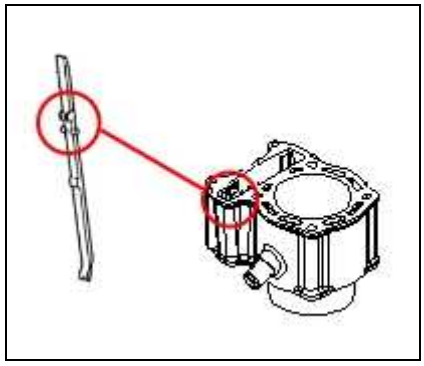
NOTE: Route cam chain through the cylinder chain room and secure it, holding it up while rotating the engine to avoid damage to the chain, drive sprocket teeth or tensioner blade.

2. Apply clean engine oil liberally to the bore and tapered area of the cylinder. Place the cylinder on to the studs.

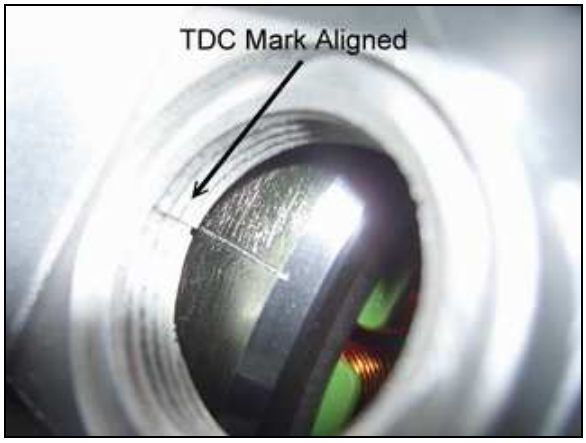


3. Install the cam chain guide and dowel pins into the cylinder. Verify the bottom end is seated properly in the crankcase.

4. Pull the cam chain through the cylinder chain room and secure with mechanic's wire.



5. Position crankshaft at Top Dead Center (TDC) on compression stroke.



CYLINDER HEAD AND CAMSHAFT INSTALLATION

NOTE: Clean the gasket surfaces on the cylinder head and cylinder. Remove all traces of old gasket material.

1. Install the dowel pin(s) and a new cylinder head gasket.

2. Pull the cam chain through the cylinder head chain room and secure with mechanic's wire.

3. Place the cylinder head on the cylinder.

4. Install the cam according to the "Cam Shaft Timing" procedure. Verify the cam chain is in place around the crankshaft gear.

NOTE: Verify camshaft-timing procedure before installing the rocker shaft assembly.

CAMSHAFT TIMING

⚠ CAUTION

Serious engine damage may result if the camshaft is not properly timed to the crankshaft.

IMPORTANT CAMSHAFT TIMING NOTE

In order to time the camshaft to the crankshaft, the piston must be precisely located at Top Dead Center (TDC). This can be accomplished using one of two methods.

Install the cam chain over the crankshaft.

When the stator housing is removed, use Method 1 This method uses the camshaft gear marks and the crankshaft keyway to establish TDC. It is important to note that this method can only be used when the stator housing is removed and the crankshaft keyway is in view. The camshaft sprocket alignment marks are parallel to the gasket surface, and camshaft lobes are pointing down. The cam chain plate links *are not* used to time the camshaft.

When the stator housing is installed, use Method 2

This method establishes accurate Top Dead Center (TDC) by aligning the single mark on the flywheel with the notch in the timing inspection hole (see Method 2).

The camshaft sprocket alignment marks are parallel to the gasket surface, and camshaft lobes are pointing down. The cam chain plate links *are not* used to time the camshaft.

ENGINE

CAMSHAFT INSTALLATION – TIMING METHOD 1

Refer to page 48

Stator housing is removed: **NOTE: Use this method only when the stator is removed and camshaft drive sprocket is in view.**

1. Rotate the crankshaft until the keyway on the crankshaft is pointed ’UP” (keyway facing upward).
2. Align the cam chain onto the teeth of the crankshaft sprocket. Use a wire to pull the chain up through the cylinder and cylinder head and to hold it in place. Secure the chain.
3. Apply grease, or engine assembly lubricant to the camshaft main journals and cam lobes. Lubricate automatic compression release mechanism with clean engine oil.
4. Orientate the camshaft with the lobes facing downward.
5. Disconnect the wire securing the cam chain and loop the cam chain over the sprocket while verifying the cam is inserted with the alignment marks parallel to the gasket surface.

6. Check all cam-timing marks to verify proper cam timing, and install the rocker arm assembly.

Torque the cylinder stud nuts to specification.

NOTE: Do not rotate engine until tensioner and rocker assembly is installed.

7. Install the tensioner and rocker assembly.
8. After tensioner installation, rotate engine at least two revolutions and re-check marks/timing.

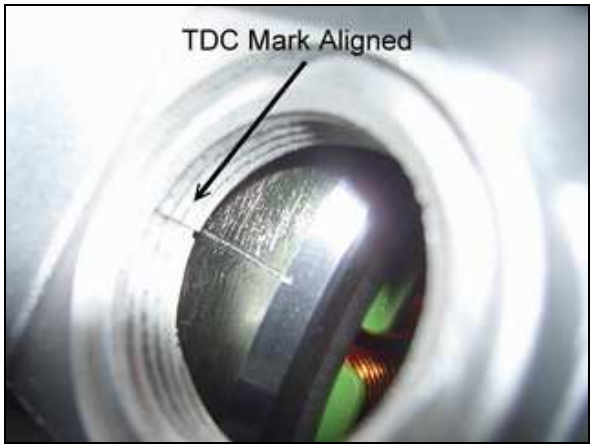
CAMSHAFT INSATALLATION – TIMING METHOD 2

Refer to page 49

Stator housing is installed: **NOTE:** Use this method only when the stator is installed and camshaft drive sprocket is in view.

1. Rotate the crankshaft until the single (TDC) timing mark (Top Dead Center) on the flywheel is view in the center of the timing inspection window.

Be sure to use the *single* TDC mark when installing the cam. Do not use any advance marks (if evident).



2. Align the cam chain onto the teeth of the cam chain drive sprocket. Use a wire to pull the chain up through the cylinder and cylinder head and to hold it in place. Secure the chain.
3. Apply grease, or molybdenum disulfide grease to the camshaft main journals and cam lobes. Lubricate automatic compression release mechanism with clean engine oil.
4. Orientate the camshaft with the lobes facing downward.
5. Disconnect the wire securing the cam chain and loop the cam chain over the sprocket while verifying the cam is inserted with the alignment marks parallel to the gasket surface.
6. Check all cam-timing marks to verify proper cam timing, and install the rocker arm assembly.

Torque the cylinder stud nuts to specification.

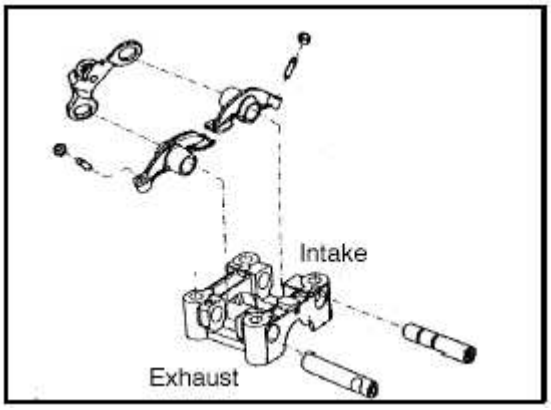
NOTE: Do not rotate engine until tensioner and rocker assembly is installed.

7. Install the tensioner and rocker assembly.
8. After tensioner installation, rotate engine at least two revolutions and re-check marks/timing.

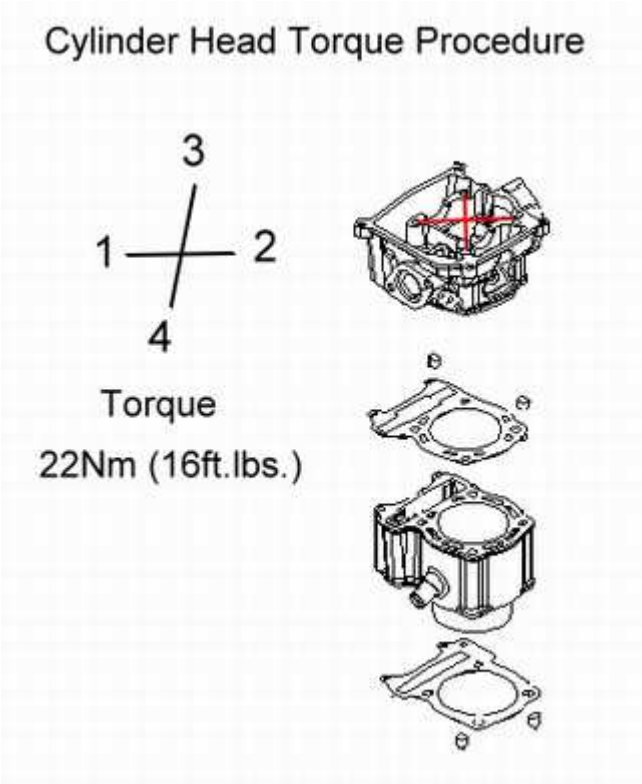
ENGINE

ROCKER SHAFT/ARM INSTALLATION

1. Assemble arms, shafts and decompression components into cam support.



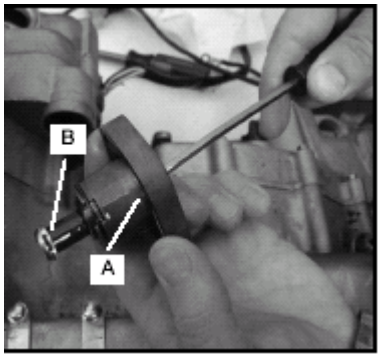
2. Install and tighten rocker shaft locking plate.
Tighten to specification.
3. Apply engine assembly lube to the cam lobes and cam follower surfaces.
4. Verify the cam lobes are pointing downward before installing rocker assembly.
5. Apply clean engine oil liberally to the valve springs, cam chain, rocker arms, and camshaft.
6. Install cylinder head nuts and torque to specification.



7. Adjust valves according to the "VALVE **CLEARANCE ADJUSTMENT PROCEDURES", Page4.39.**
8. Install rocker cover and torque bolts to specification.

CAM CHAIN TENSIONER INSTALLATION

1. Using a small flat blade screwdriver, turn the tensioner clockwise to retract the plunger (B) all the way into the tensioner body.



2. With the plunger retracted, install the tensioner assembly with a new gasket and tighten the bolts to specification.

Tensioner Bolt Torque:
10 Nm (7.4 ft. lbs.)

3. Install the tensioner cap. Torque cap to specification.

Tensioner Cap Torque:
10 Nm (7.4 ft. lbs.)

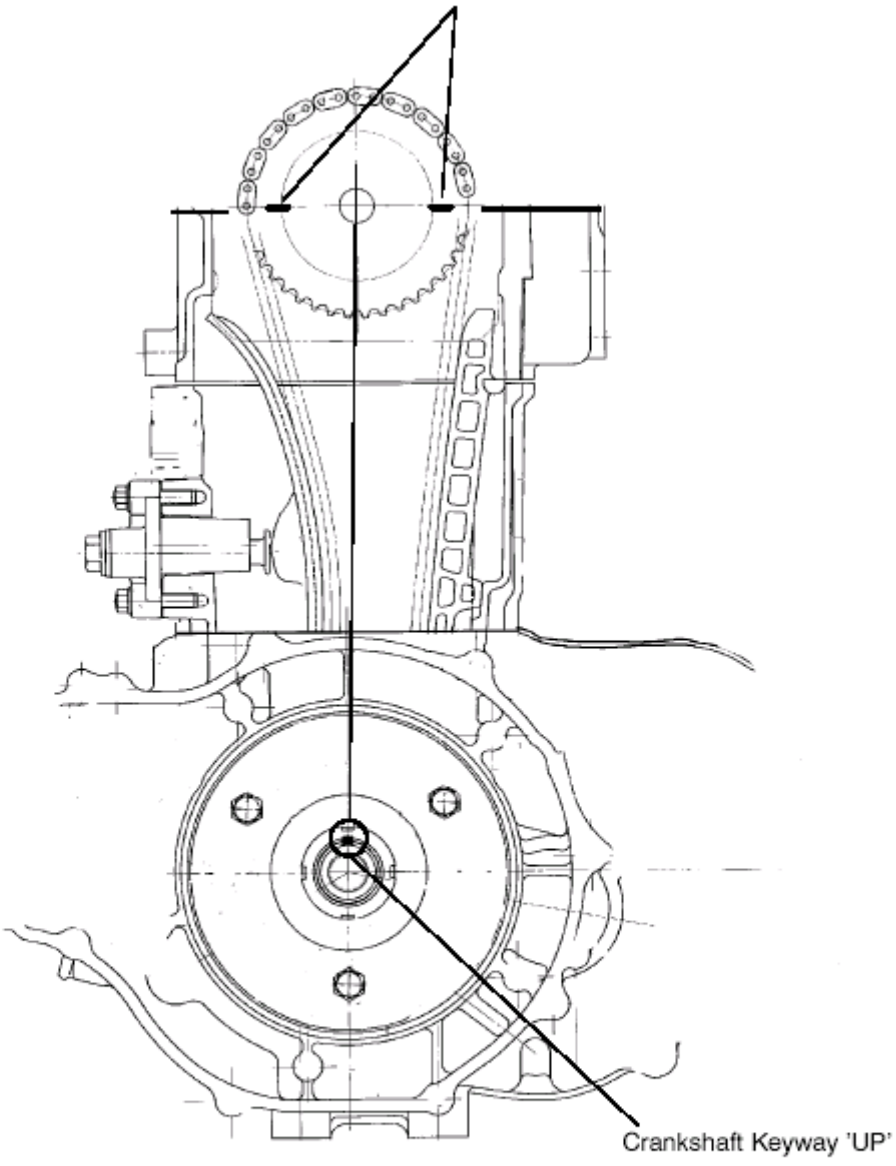
4. Slowly rotate engine two to three revolutions and re-check cam timing once chain is tight.

ENGINE

CAMSHAFT TIMING - METHOD 1

Method 1 - Camshaft Timing with Stator Housing Removed

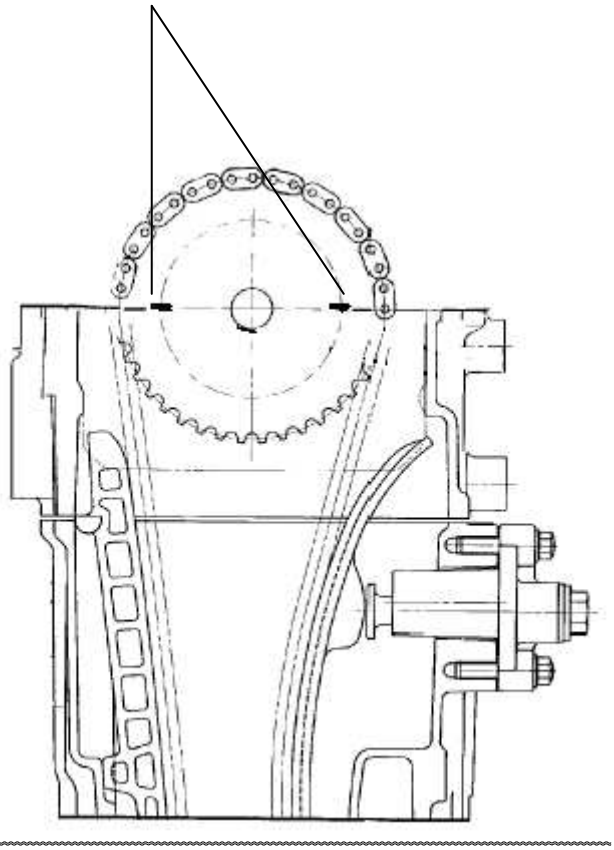
Sprocket marks aligned with gasket surface at TDC on compression stroke (cam lobes facing downward)

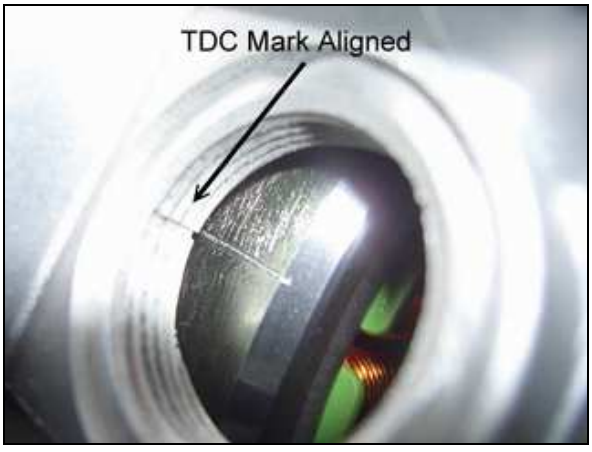


CAMSHAFT TIMING - METHOD 2

Method 2 - Camshaft Timing Using Flywheel TDC Mark

Sprocket marks aligned with gasket surface at TDC on compression stroke (cam lobes facing downward)





Cam Timing

(View through timing inspection hole)

Position crankshaft at TDC

ENGINE

INTAKE VALVE CLEARANCE ADJUSTMENT

1. Verify cam lobes are pointed down.
2. Insert a 0.1mm feeler gauge between end of intake valve stem and adjuster screw.
3. When clearance is correct, hold adjuster screw and tighten locknut securely.
4. Re-check the valve clearance.
5. Repeat adjustment procedure if necessary until clearance is correct with locknut secured.

VALVE CLEARANCE
0.1 mm

EXHAUST VALVE CLEARANCE ADJUSTMENT

1. Verify cam lobes are pointed down.
2. Insert a 0.12mm feeler gauge between end of exhaust valve stem and adjuster screw.
3. Loosen locknut and turn adjuster screw until there is a slight drag on feeler gauge.
4. When clearance is correct, hold adjuster screw and tighten locknut securely.
5. Re-check the valve clearance.
6. Repeat adjustment procedure if necessary until clearance is correct with locknut secured.

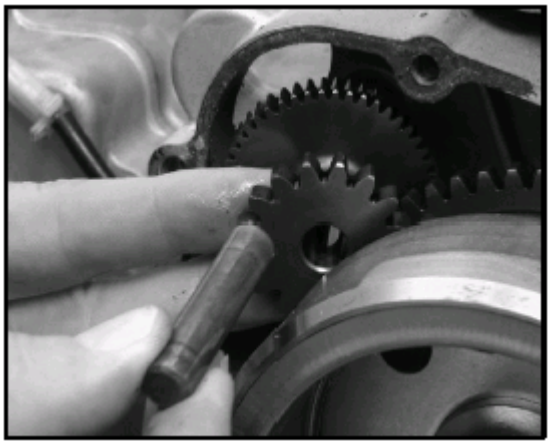
VALVE CLEARANCE
0.12 mm

1. Install flywheel key, flywheel washer, and nut. Torque flywheel nut to specification.
2. Install oil passage plug onto crankshaft.

Flywheel Nut Torque:
100 Nm

STARTER DRIVE ASSEMBLY

1. Be sure the washer is positioned on the back of the drive gear.

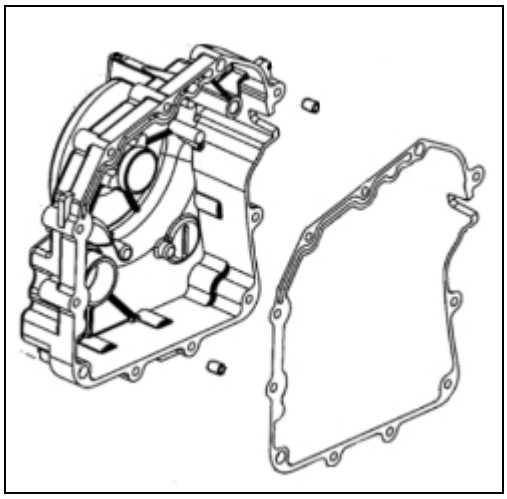


2. Apply Starter Drive Grease to the drive bushings in the cases and all moving surfaces of the starter drive gears and install.
3. Install stator housing and torque bolts to specification.

STATOR HOUSING INSTALLATION

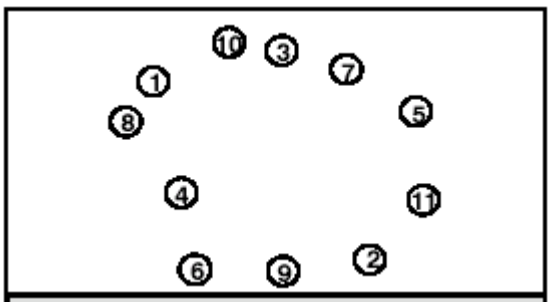
NOTE: The stator, flywheel, starter drive, and stator can be serviced with the engine in the frame.

1. Apply a light amount of Crankcase Sealant to the mounting surface and install a new gasket. Install the dowel pins.



2. Seal stator wire grommet with Crankcase Sealant.

3. Install the housing. Torque bolts in sequence to specification.



Stator Cover Bolt Torque:
8 Nm (6 ft. lbs.)

SPARK PLUG FOULING TROUBLESHOOTING

◎ Spark plug cap loose or faulty

◎ Choke cable adjustment or plunger/cable sticking

◎ Foreign material on choke plunger seat or plunger

◎ Incorrect spark plug heat range or gap

◎ Carburetor inlet needle and seat worn

◎ Jet needle and/or needle jet worn or improperly adjusted

◎ Excessive carburetor vibration (loose or missing needle jet locating pins)

◎ Loose jets in carburetor or calibration incorrect for altitude/temperature

◎ Incorrect float level setting

◎ CVT system calibrated incorrectly or components worn or miss-adjusted

◎ Fuel quality poor (old) or octane too high

◎ Low compression

◎ Restricted exhaust

◎ Weak ignition (loose coil ground, faulty coil, or stator,)

◎ Restricted air filter (main or pre-cleaner) or breather system

◎ Improperly assembled air intake system

◎ Restricted engine breather system

◎ Oil contaminated with fuel

◎ Restricted crankcase vent

TROUBLESHOOTING

Engine Turns Over But Fails to Start

◎ No fuel
◎ Fuel injector carbon built.
◎ Fuel pressure less than 250kpa.
◎ Fuel pump inoperative/restricted
◎ Tank vent or fuel hose plugged
◎ Engine flooded
◎ Low compression (high cylinder leakage)
◎ No spark (Spark plug fouled)
◎ Spark plug coil lost power.
◎ Without valve clearance.

Engine Does Not Turn Over

◎ Dead battery
◎ Starter motor does not turn
◎ Engine seized, rusted, or mechanical failure
◎ One way clutch components damaged or sliding.

Engine Runs But Will Not Idle

◎ Restricted throttle pilot system.
◎ Air mixture screw misadjusted.
◎ Idle speed control valve failure.
◎ Low compression.
◎ Crankcase breather restricted.
◎ Air filter restriction.
◎ Oxygen sensor connects corrosion or short circuit.

Engine Idles But Will Not Accelerate

◎ Spark plug fouled/weak spark.
◎ Broken throttle cable.
◎ Obstruction in air intake.
◎ Air box removed (reinstall all intake components)
◎ Incorrect or restricted fuel injector.
◎ Reverse speed limiter limiting speed.
◎ Map fault.
◎ Incorrect ignition timing
◎ Restricted exhaust system
◎ Cam Lobe worn

Engine Has Low Power

◎ Spark plug fouled
◎ Restricted exhaust muffler
◎ Dirty carburetor
◎ Cam lobe worn
◎ Too much engine oil in crankcase.
◎ CVT not operating properly
◎ Cylinder, piston, ring, or valve wear or damage (check compression)

Piston Failure - Scoring

◎ Lack of lubrication
◎ Dirt entering engine through cracks in air filter or ducts
◎ Engine oil dirty or contaminated

Excessive Smoke and Carbon Buildup

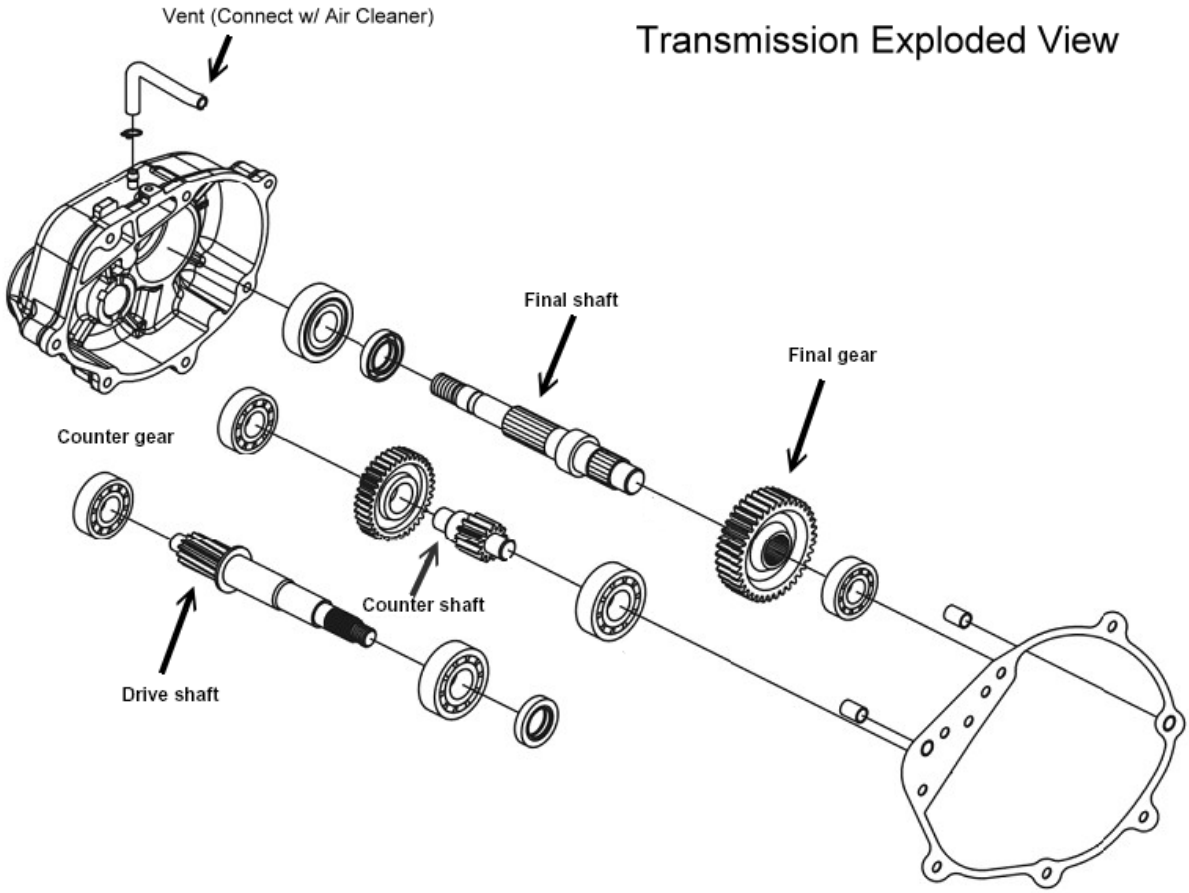
◎ Worn rings, piston, or cylinder
◎ Excessive piston-to-cylinder clearance
◎ Worn valves, guides or seals
◎ Restricted crankcase vent
◎ Air filter dirty or contaminated

Low Compression

◎ Decompressor stuck
◎ Cylinder head gasket leak
◎ No valve clearance or incorrectly adjusted
◎ Cylinder or piston worn
◎ Piston rings worn, leaking, broken, or sticking
◎ Bent valve or stuck valve
◎ Valve spring broken or weak
◎ Valve not seating properly (bent or carbon accumulated on valve area)
◎ Rocker arm sticking

Backfiring

◎ Speed limiter system malfunction
◎ Fouled spark plug or incorrect plug or plug gap
◎ Map faulty - lean condition
◎ Intake / Exhaust system air leaks
◎ Ignition system faulty:
◎ Spark plug cap cracked/broken
◎ Ignition coil faulty
◎ Ignition or kill switch circuit faulty
◎ Ignition timing incorrect
◎ Sheared flywheel key
◎ Poor connections in ignition system
◎ System wiring wet
◎ Cam lobe worn or Valve sticking
◎ Lean condition



TRANSMISSION DISASSEMBLY

NOTE: Engine removal is not required to service

1. Remove the rear wheel.
2. Drain out gear oil from gearbox.
3. Remove cir-clip of gearbox cover.

4. Loosen 7 bolts and remove gearbox cover.

5. Remove the gasket & dowel pin.
6. Remove counter gear first.

7. Remove Final shaft and gear.

CAUTION

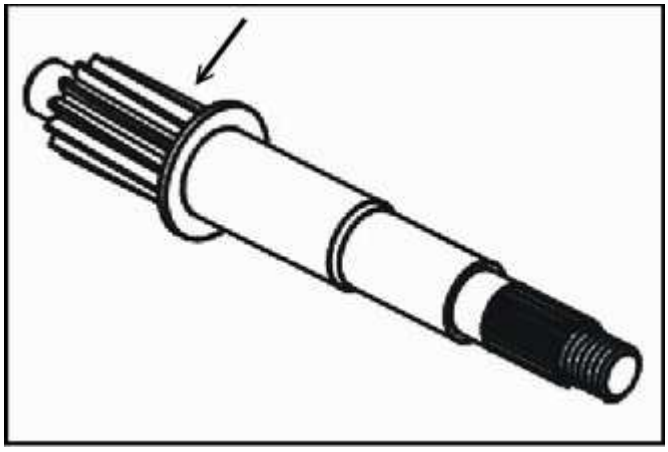
◎ It is not necessary to remove the drive shaft from the cover upper side.
◎ If remove the drive shaft from the gear box cover which its bearing has to be replaced.

TRANSMISSION INSPECTION

1. With transmission components removed, inspect all shaft bearings visually and by feel. Bearings should roll smoothly, without excessive movement or noise. Replace any bearing that is removed, as the removal process destroys the bearing.

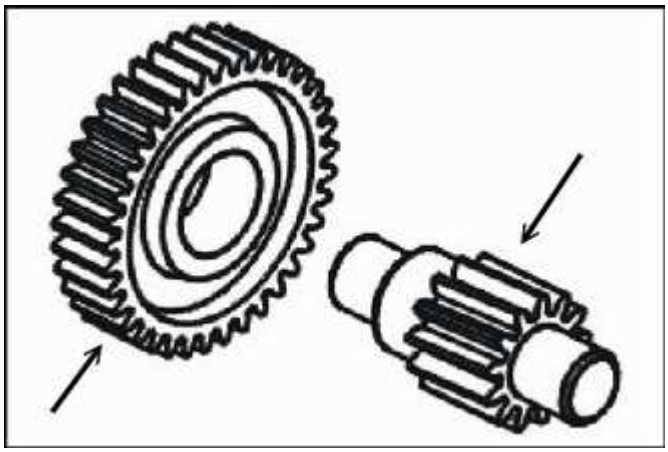
2. Bearings can be removed using a standard blind bearing remover. Apply lithium grease to outer race of new bearings and press into cover or case by the outer race. Do not press on inner race or bearing will be damaged.

DRIVE SHAFT INSPECTION



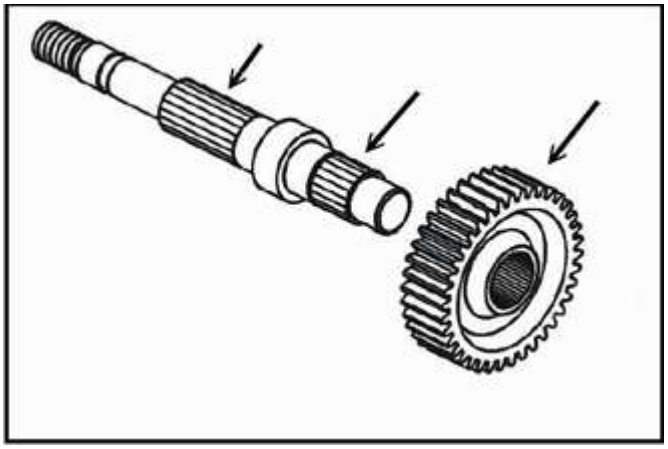
Inspect the drive shaft and gear visually without excessive wear or crack. Replace any damaged components.

COUNTER SHAFT / GEAR INSPECTION



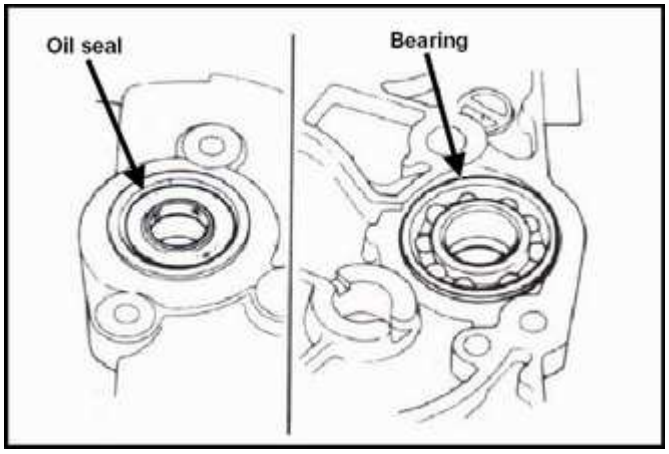
Inspect the counter shaft and gear visually without excessive wear or crack. Replace any damaged components.

FINAL SHAFT / GEAR INSPECTION



Inspect the final shaft and gear visually without excessive wear or crack. Replace any damaged components.

BEARING AND OIL SEAL INSPECTION



Check bearings on gearbox cover.

Rotate each bearing's inner ring with fingers.

Check if bearings can be rotated smoothly and silently, and also check if bearing outer ring is mounted on gear tightly.

If bearing rotation is uneven, noising, or loose bearing mounted, then replace it.

Check oil seal for wear or damage, and replace it if necessary.

Check gearbox bearing as the same way above, and replace it if necessary.

TRANSMISSION TROUBLESHOOTING

Noise

- Incorrect transmission lubricant
- Lubricant level too low
- Lubricant level too high
- Bearings worn or damaged
- Gears worn or damaged
- CVT problem (belt)
- Final drive (chain or sprockets) worn or damaged

ELECTRONIC FUEL INJECTION

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⚠ WARNING

* Gasoline is extremely flammable and explosive under certain conditions.
* EFI components are under high pressure. Verify system pressure has been relieved before disassembly.
* Never drain the fuel system when the engine is hot. Severe burns may result.
* Do not overfill the tank. The tank is at full capacity when the fuel reaches the bottom of the filler neck.
Leave room for expansion of fuel.
* Never start the engine or let it run in an enclosed area. Gasoline powered engine exhaust fumes are poisonous and can cause loss of consciousness and death in a short time.
* Do not smoke or allow open flames or sparks in or near the area where refueling is performed or where gasoline is stored.
* If you get gasoline in your eyes or if you should swallow gasoline, seek medical attention immediately.
* If you spill gasoline on your skin or clothing, immediately wash with soap and water and change clothing.
* Always stop the engine and refuel outdoors or in a well-ventilated area.

SPECIAL TOOLS

Part Number	Tool Description
07100201-000	Diagnostic Tool PC Cable
Missing	Cable, RS232/USB Conversion
Missing	KWP Diagnostic Software
Missing	Fuel pressure gauge

SERVICE NOTES

• For more convenient and accurate testing of EFI components, it is recommended dealers utilize the KWP Diagnostic Tool Software (dealer only), or testing may be done manually using

• There had 80% problems of all EFI problems caused by wiring harness connections.

• Never attempt to service any fuel system component while engine is running or ignition switch is "on."

• Cleanliness is essential and must be maintained at all times when servicing or working on the EFI system. Dirt, even in small quantities, can cause significant problems.

• Do not use compressed air if the system is open. Cover any parts removed and wrap any open joints with plastic if they will remain open for any length of time. New parts should be removed from their protective packaging just prior to installation.

• Clean any connector before opening to prevent dirt from entering the system.

• Although every precaution has been taken to prevent water intrusion failure, avoid direct water or spray contact with system components.

• Do not disconnect or reconnect the wiring harness connector to the control unit or any individual components with the ignition "on." This can send a damaging voltage spike through the ECU.

• Do not allow the battery cables to touch opposing terminals. When connecting battery cables attach the positive (red) cable to positive (+) battery terminal first, followed by negative (black) cable to negative (-) battery terminal.

• Never start the engine when the cables are loose or poorly connected to the battery terminals.

• Never disconnect battery while engine is running.

• Never use a battery boost-pack to start the engine.

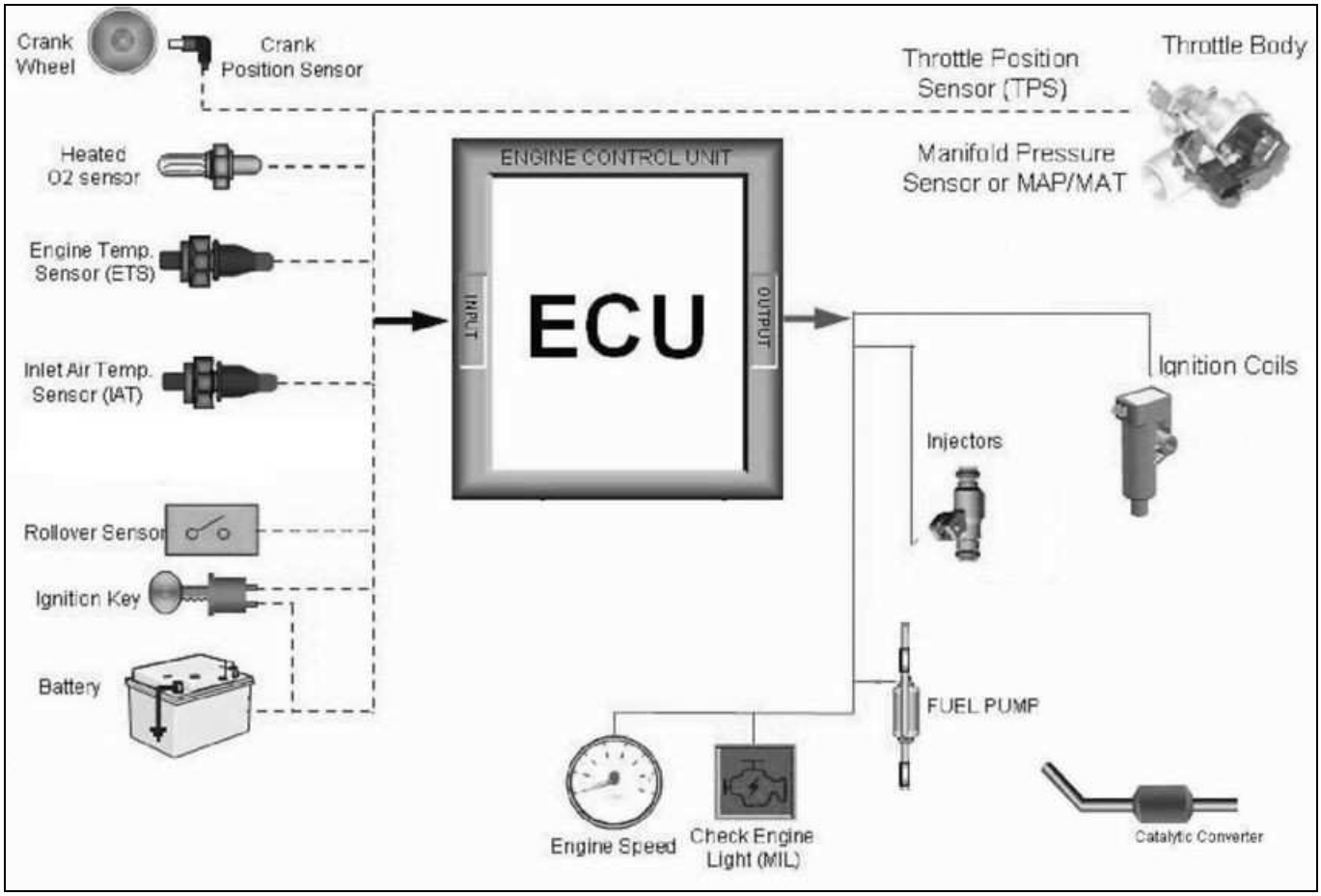
• Do not charge battery with key switch "on."

• Always disconnect negative (-) battery cable lead before charging battery.

• Always unplug ECU from the wire harness before performing any welding on the unit.

EFI SYSTEM EXPLODED VIEW

1. Electronic Control Unit (ECU)
2. Intake Air Temperature (IAT)
3. Crankshaft Position Sensor (CPS)
4. Fuel Injectors
5. Fuel Pump
6. Fuel Pump Regulator
6. Engine Coolant Sensor (ECT)
7. Throttle Position Sensor (TPS)
8. Throttle Body
9. Ignition Coil
10. Rollover Sensor
11. Idle Air Control Valve

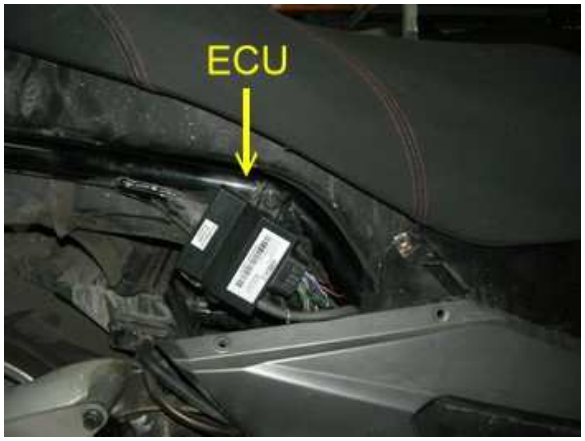


ELECTRONIC FUEL INJECTION

EFI SYSTEM COMPOMENT LOCATIONS

1. **Electronic Control Unit (ECU)**

Located bottom of the seat right side attaching on mainframe.



2. **Intake Air Temperature (IAT)**

Located in the rubber intake boot between the air box and throttle body.

3. **Crankshaft Position Sensor (CPS)**

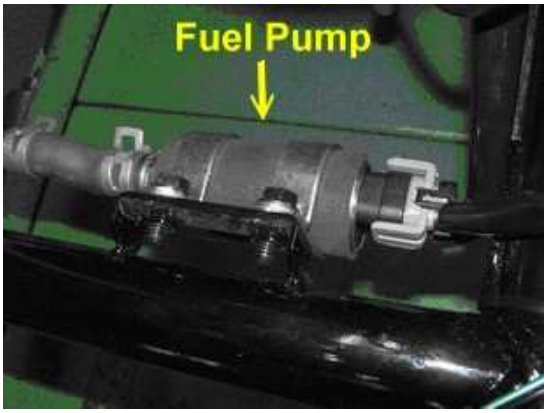
Located in the magneto cover between the engine and transmission.

4. **Fuel Injectors / Fuel Rail**

Attached to the fuel rail located in the intake track of the cylinder head.

5. **Fuel Pump**

Located bottom of the frame behind the fuel tank and next the relief valve.

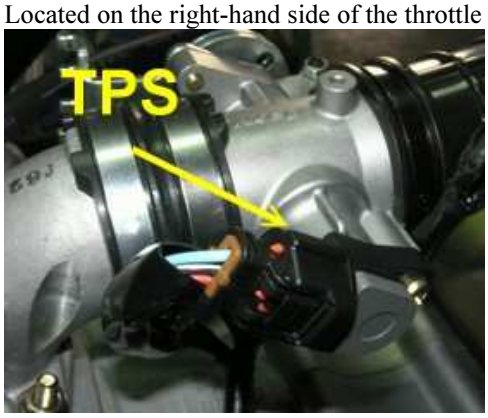


6. **Fuel Pump Regulator**

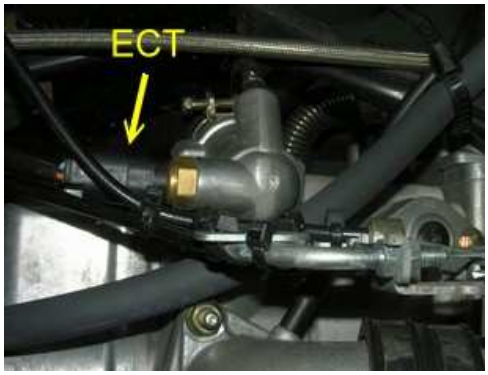
Located bottom of the frame behind the fuel tank and next the fuel pump.

7. **Throttle Body**
Located between the rubber air box boot and the manifold.

8. **Throttle Position Sensor (TPS)**
Located on the right-hand side of the throttle body.

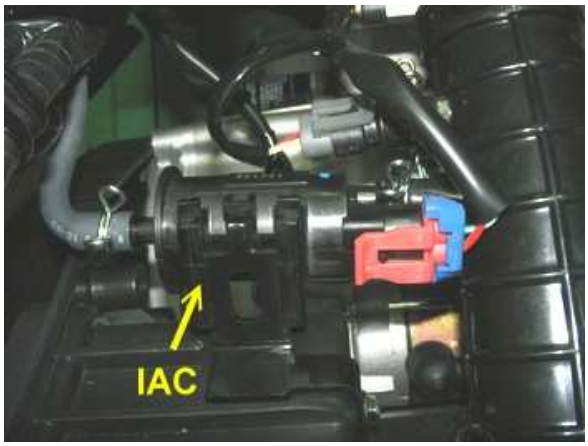


9. **Engine Coolant Temperature Sensor (ECT)**
Located in the cylinder head next to the thermostat housing.

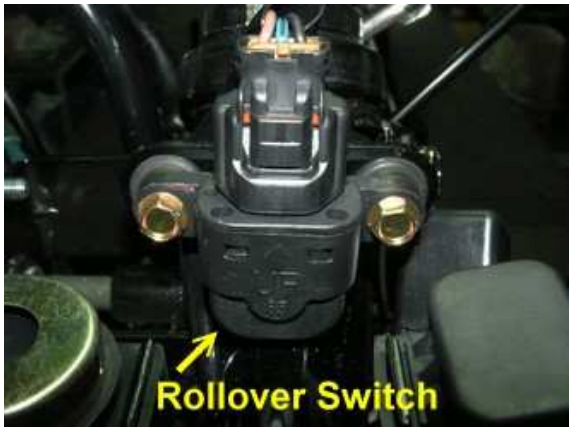


10. **Ignition Coil**
Located under the storage box and fastened at left of frame.

11. **Idle Air Control Valve**
Located in the rubber intake boot between the air box and throttle body.



12.**Rollover sensor**
Located in front of middle handlebar.



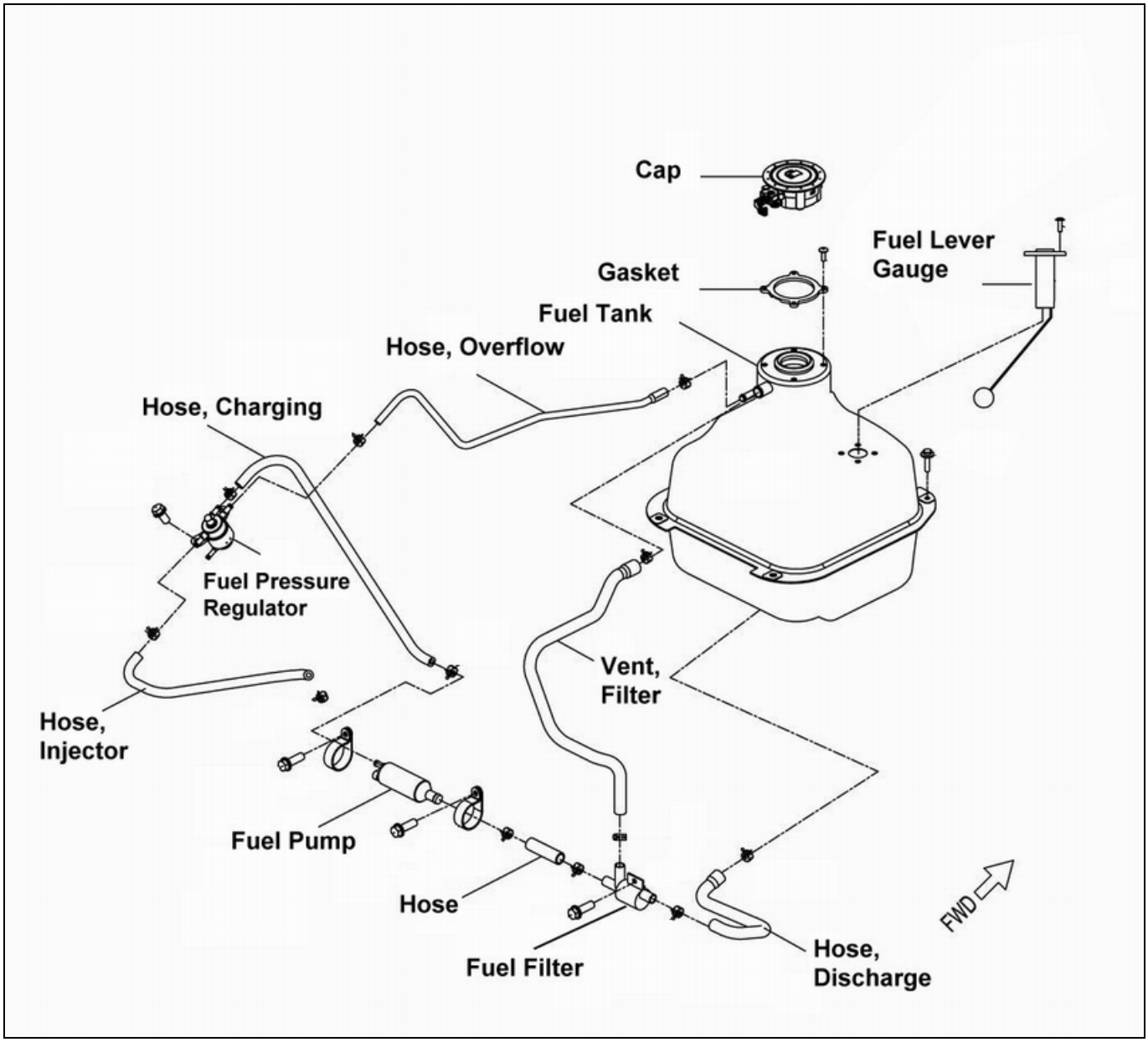
13. **O2 Sensor**
Located in front exhaust pipe elbow.

ELECTRONIC FUEL INJECTION

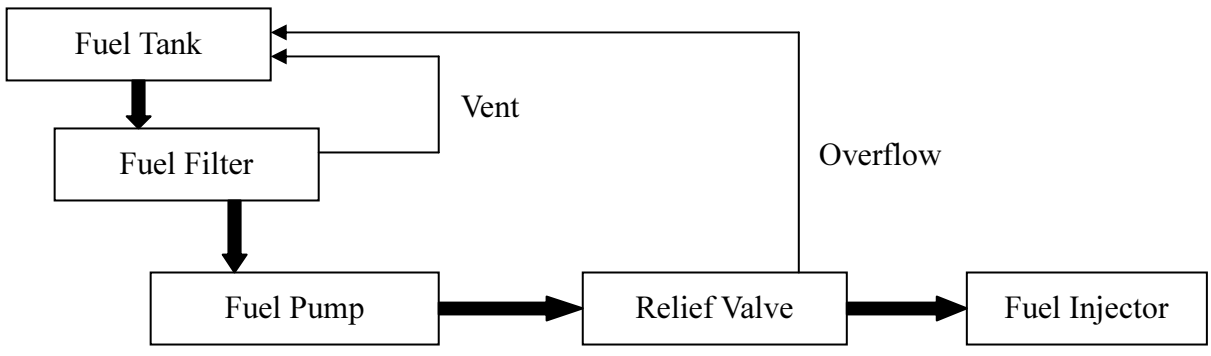
FUELTANK

ELECTRONIC FUEL INJECTION

FUEL TANK EXPLODED VIEW



FUEL FLOW CHART



ELECTRONIC FUEL INJECTION

EFI OPERATION OVERVIEW

The EFI system is designed to provide peak engine performance with optimum fuel efficiency and lowest possible emissions. The ignition and injection functions are electronically controlled, monitored and continually corrected during operation to maintain peak performance.

The central component of the system is the Engine Control Unit (ECU), which manages system operation, determining the best combination of fuel mixture and ignition timing for the current operating conditions.

An electric fuel pump is used to move fuel from the tank through the fuel line and in-line fuel filter. At the engine, fuel is fed through the fuel rail and into the injectors, which inject into the intake ports. The ECU controls the amount of fuel by varying the length of time that the injectors are "on." This can range from 1.5-8.0 milliseconds depending on fuel requirements. The controlled injection of the fuel occurs each crankshaft revolution, or twice for each 4-stroke cycle.

One-half the total amount of fuel needed for one firing of a cylinder is injected during each injection. When the intake valve opens, the fuel/air mixture is drawn into the combustion chamber, ignited and burned.

The ECU controls the amount of fuel being injected and the ignition timing by monitoring the primary sensor signals for air temperature, barometric air pressure, engine temperature, speed (RPM), and throttle position (load). These primary signals are compared to the programming in the ECU computer chip, and the ECU adjusts the fuel delivery and ignition timing to match the values.

During operation the ECU has the ability to re-adjust temporarily, providing compensation for changes in overall engine condition and operating environment, so it will be able to maintain the ideal air/fuel ratio.

During certain operating periods such as cold starts, warm up, acceleration, etc., a richer air / fuel ratio is automatically calculated by the ECU.

The ECU is the brain or central processing computer of the entire EFI fuel/ignition management system. During operation, sensors continuously gather data which is relayed through the wiring harness to input circuits within the ECU. Signals to the ECU include: ignition (on/off), crankshaft position and speed (RPM), throttle position, engine coolant temperature, air temperature, and intake manifold air pressure and battery voltage.

The ECU compares the input signals to the programmed maps in its memory and determines the appropriate fuel and spark requirements for the immediate operating conditions. The ECU then sends output signals to set the injector duration and ignition timing.

During operation, the ECU continually performs a diagnostic check of itself, each of the sensors, and system performance. If a fault is detected, the ECU turns on the “Check Engine” light in the speedometer and stores the fault code in its fault memory. Depending on the significance or severity of the fault, normal operation may continue, or "Fail-Safe" operation (slowed speed, richer running) may be initiated. A technician can determine the cause of the “Check Engine” light by initiating the “Blink Code” sequence or by using **Digital EFI Diagnostic Software.**

ELECTRONIC FUEL INJECTION

The ECU requires a minimum of 5.0 volts to operate. The memory in the ECU is operational the moment the battery cables are connected. To prevent engine over-speed and possible failure, a delimiting feature is programmed into the ECU. If the maximum RPM limit (8500) is exceeded, the ECU suppresses the injection signals, cutting off the fuel flow. This process repeats it self in rapid succession, limiting operation to the preset maximum.

ECU SERVICE

Never attempt to disassemble the ECU. It is sealed to prevent damage to internal components. Warranty is void if the case is opened or tampered with in any way.

All operating and control functions within the ECU are pre-set. No internal servicing or readjustment may be performed. If a problem is encountered, and you determine the ECU to be faulty, contact the AEON Service Department for specific handling instructions. Do not replace the ECU without factory authorization.

The relationship between the ECU and the throttle position sensor (TPS) is very critical to proper system operation. If the TPS is faulty, or the mounting position of the TPS to the throttle body is altered, the TPS must be re-initialized (see TPS Initialization for procedure if required).

For the purpose of troubleshooting, a known-good ECU from another AEON ***ELITE 350i OR URBAN 350i*** EFI of the same model may be used without system or engine component damage.

ECU REPLACEMENT

1. Remove the (2) retaining screws holding the ECU.
2. With the Ignition turned off, disconnect the wire harness from the ECU.
3. To install, reverse the procedures and tighten screws to specification.

= T
ECU Retaining Screws **2.5 Nm (22 in. lbs.)**

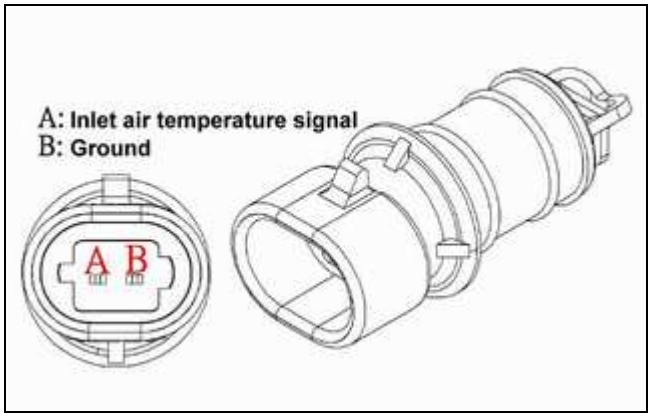
IAT OPERATION OVERVIEW

Mounted in the throttle body intake boot.

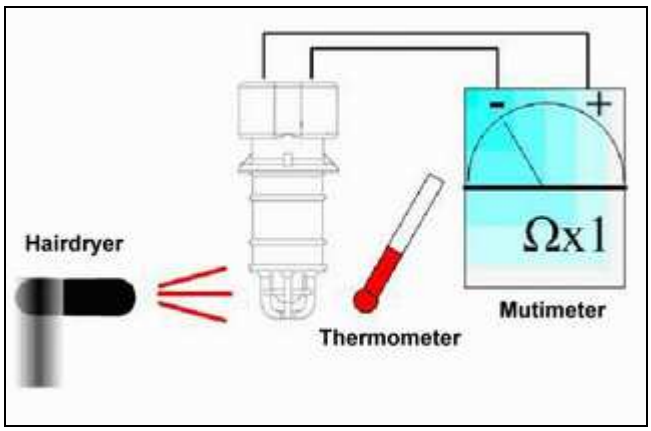
Air passing through the intake is measured by the IAT and relayed temperature readings to the ECU and compared to its programming for determining the fuel and ignition requirements during operation.

IAT TEST

The IAT is a sealed, non-serviceable assembly. If fault code diagnosis indicates a problem within this sensor, test as follows:



1. Disconnect IAT (2-wire) harness connector on the left-hand side of throttle body boot.



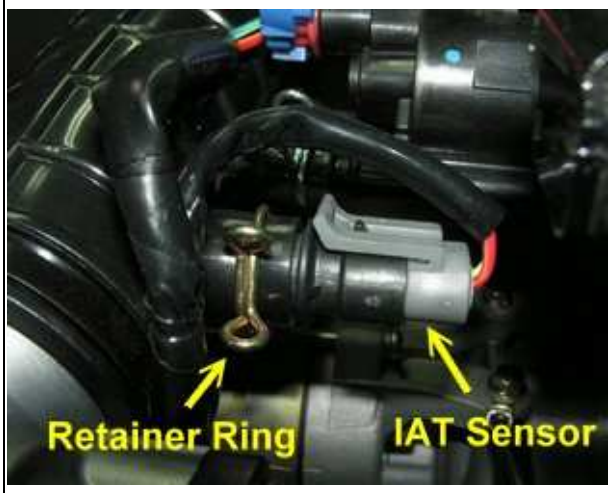
2. Connect an ohmmeter between the pin terminals leading from the Red and White wires. A resistance value of 2795±70 Ω at room temperature (25℃ / 77℉) should be obtained.

Resistance Specification: **560Ω・±・10% (25℃ / 77℉)**

CRANKSHAFT POSITION SENSOR

IAT Replacement

1. Disconnect sensor from engine harness.

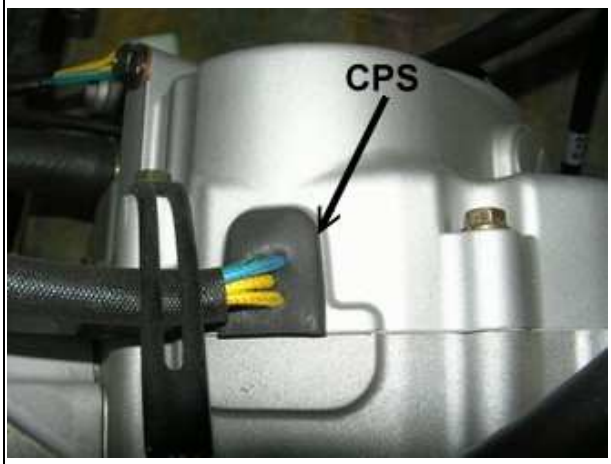


2. Remove the retaining ring and remove the sensor from the intake boot.

3. Install new sensor.

CPS OPERATION OVERVIEW

The crankshaft position sensor is essential to engine operation, constantly monitoring the rotational speed (RPM) and position of the crankshaft.



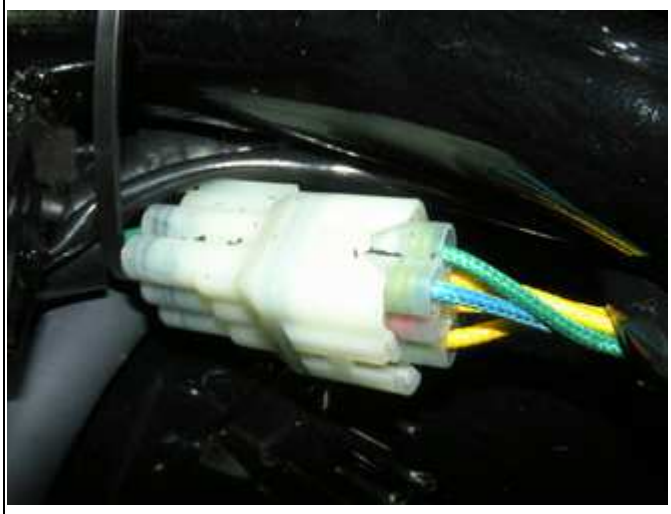
A ferromagnetic 23-tooth is mounted on the flywheel. During rotation, an AC pulse is created within the sensor for each passing tooth. The ECU calculates engine speed from the time interval between the consecutive pulses.

The two-tooth gap creates an “interrupt” input signal, corresponding to specific crankshaft position for PTO cylinder. This signal serves as a reference for the control of ignition timing by the ECU.

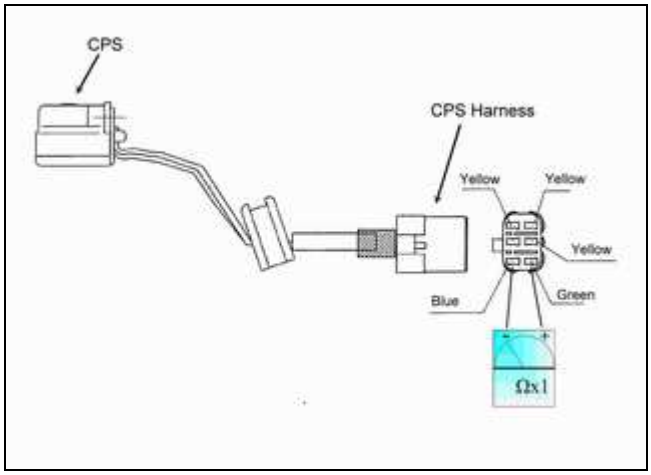
Synchronization of the CPS and crankshaft position takes place during the first two revolutions each time the engine is started. This sensor must be properly connected at all times. If the sensor fails or becomes disconnected for any reason, the engine will quit running.

CPS TEST

1. Disconnect CPS (5-wire) harness connector under storage box of the vehicle located front the cylinder.



2. Connect an ohmmeter between the pin terminals leading from the Blue and Green wires. A resistance value of 110~500Ω at room temperature (25℃ / 77℉) should be obtained.



3. If the resistance is correct.

Test the main harness circuit between the sensor connector terminals and the corresponding pin terminals at the ECU (see wiring diagram).

Check the sensor mounting, air gap, flywheel ring gear for damage or run out, and flywheel key. Follow the “CPS Replacement” procedure to inspect CPS and flywheel ring gear for damage.

4. If the resistance is incorrect, follow the “CPS Replacement” procedure.

CPS Resistance Specification:
110~500Ω(25℃ / 77℉)

CPS REPLACEMENT

Removal

1. Safely support the rear of the vehicle off the ground and remove the left-hand rear tire.

⚠ WARNING

Serious injury may result if machine tips or falls. Be sure the vehicle is secure before beginning this service procedure.

2. Remove seat.
3. Remove storage box.
4. Remove right side service panel.
5. Remove right side footwall panel.
6. Remove exhaust pipe and silencer.

7. Drain all engine oil.
8. Remove 10 bolts retain on right crankcase.
9. Remove right crank-cover which with stator and CPS.

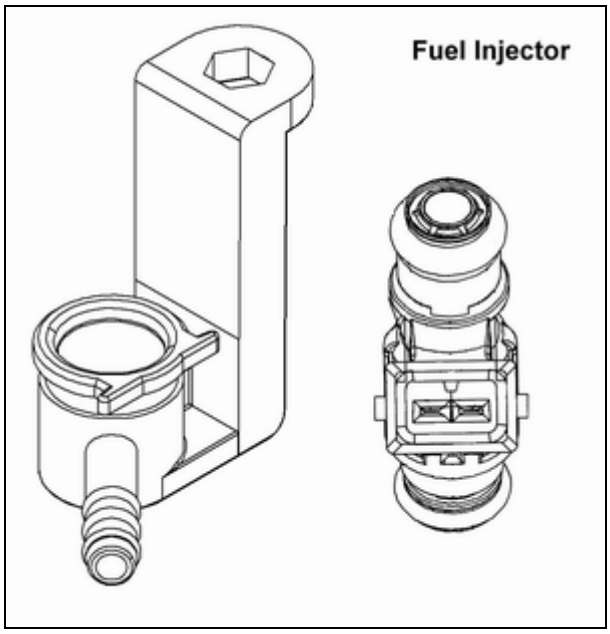
10. Remove 2 retains bolts and the CPS.
11. Install new sensor.
12. Torque the CPS retaining bolt to specification.

= T

CPS Retaining Bolt Torque:
2.5 Nm (22 in. lbs.)

FUEL INJECTOR OPERATION OVERVIEW

The fuel injector mount into the cylinder head, and the fuel rail attaches to them at the top end. Replaceable O-rings on both ends of the injector prevent external fuel leaks and also insulate it from heat and vibration.



When the key switch is on, the fuel rail is pressurized, and voltage is present at the injector. At the proper instant, the ECU completes the ground circuit, energizing the injector.

ELECTRONIC FUEL INJECTION

The valve needle in the injector is opened electro magnetically, and the pressure in the fuel rail forces fuel down through the inside. The “director plate” at the tip of the injector (see inset) contains a series of calibrated openings, which directs the fuel into the intake port in a cone-shaped spray pattern.

The injector is opened and closed once for each crankshaft revolution, however only one-half the total amount of fuel needed for one firing is injected during each opening. The amount of fuel injected is controlled by the ECU and determined by the length of time the valve needle is held open, also referred to as the “injection duration” or “pulse width”. It may vary in length from 1.5-8 milliseconds depending on the speed and load requirements of the engine.

FUEL INJECTOR SERVICE

Injector problems typically fall into three general categories electrical, dirty / clogged, or leakage. An electrical problem usually causes one or both of the injectors to stop functioning. Several methods may be used to check if the injectors are operating.

• With the engine running at idle, feel for operational vibration, indicating that they are opening and closing.

• When temperatures prohibit touching, listen for a buzzing or clicking sound with a screwdriver or mechanic's stethoscope.

• Disconnect the electrical connector from an injector and listen for a change in idle performance (only running on one cylinder) or a change in injector noise or vibration.

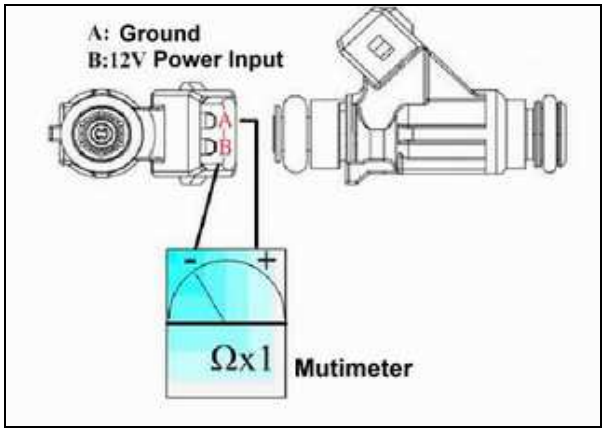
NOTE: Do not apply voltage directly to the fuel injector(s). Excessive voltage will burn out the injector(s). Do not ground the injector(s) with the ignition on. Injector wills open/turn on if relay is energized.

If an injector is not operating, it can indicate either a bad injector, or a wiring/electrical connection problem. Check as follows:

Injector leakage is very unlikely, but in rare instances it can be internal (past the tip of the valve needle), or external (weeping\ around the injector body). The loss of system pressure from the leakage can cause hot restart problems and longer cranking times. Injector problems due to dirt or clogging are unlikely due to the design of the injectors, the high fuel pressure, the use of filters and the detergent additives in the gasoline. Symptoms that could be caused by dirty/clogged injectors include rough idle, hesitation/stumble during acceleration, or triggering of fault codes related to fuel delivery. Injector clogging is usually caused by a buildup of deposits on the director plate, restricting the flow of fuel, resulting in a poor spray pattern. Some contributing factors to injector clogging include; dirty air filters, higher than normal operating temperatures, short operating intervals and dirty, incorrect, or poor quality fuel. Cleaning of clogged injectors is not recommended; they should be replaced. Additives and higher grades of fuel can be used, as a preventative measure if clogging has been a problem.

FUEL INJECTOR TEST

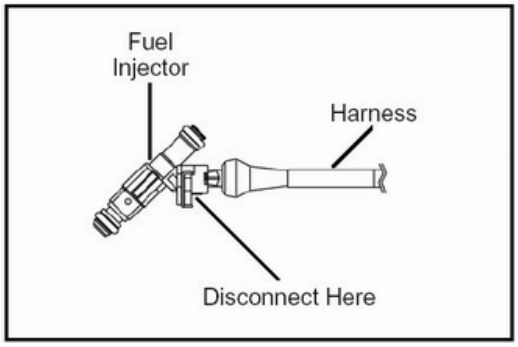
The fuel injectors are non-serviceable. If fault code diagnosis indicates a problem with injector, test the resistance of the fuel injector(s) by measuring the harness pin terminals.



Fuel Injector Resistance Specification:
13.8 - 15.2Ω(25℃ / 77℉)

FUEL INJECTOR REPLACEMENT

1. Be sure the engine has cooled enough to work on.
2. Remove the seat and the storage box.
3. Thoroughly clean the area around the fuel injectors including the throttle body manifold.
4. Using a 6mm hex wrench, loosen the fuel rail mounting screw from the cylinder head. Carefully pull the rail away from the injectors and remove the injector from the cylinder head along with the harness.

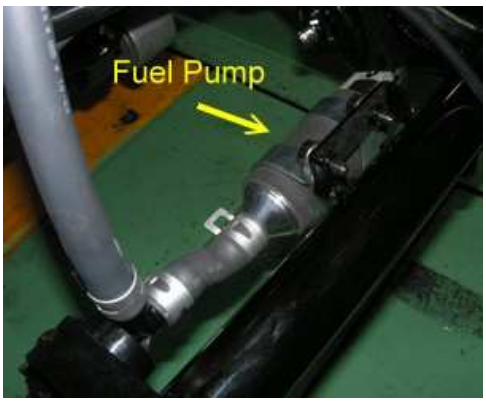


5. Reverse the previous procedures to install the new injector and reassemble.
6. Lubricate O-rings lightly with oil to aid installation. Torque the fuel rail mounting screw to specification.

= T
Fuel Rail Mounting Screw 2.5 Nm (22 in. lbs.)

FUEL PUMP OPERATION OVERVIEW

An electric fuel pump is used to transfer fuel to the EFI system from the fuel tank.

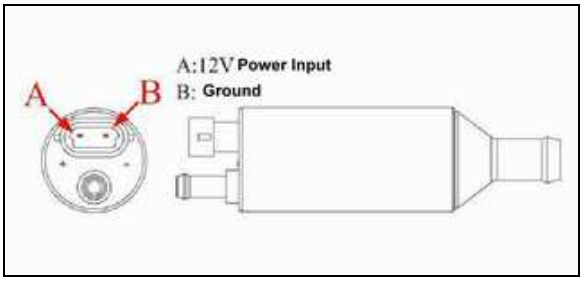


The pump rate had a minimum 14.4 liters per hour at 3.0 bar (43.5 psi) output.

When the key switch is turned to "ON", the ECU activates the fuel pump, which pressurizes the system for start-up.
The ECU switches off the pump preventing the continued delivery of fuel in these instances:
• If the key switch is not promptly turned to the "start" position.
• If the engine fails to start
• If the engine is stopped with the key switch "on" (as in the case of an accident).
In these situations, the “check engine” light will go on, but will turn off after 4 cranking revolutions if system function is OK. Once the engine is running, the fuel pump remains on.

FUEL PUMP TEST

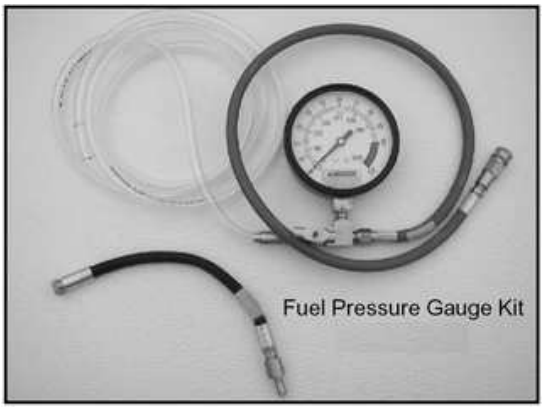
The fuel pump is non-serviceable. If fault code diagnosis indicates a problem within this, It may be possible that the fuel pump must be replaced.



⚠ WARNING

Check the fuel test for any possible fuel seepage after performing any tests or procedures. Fuel is extremely flammable and may cause severe burns, injury, or death.
Do not use any device that produces a flame or electrical devices that may spark around fuel or fuel vapors.

1. Remove both inlet and discharge hoses from the fuel pump.



2. Connect the pressure hose of the fuel pressure gauge to the fuel pump discharge cock.
Connect the clear hose into fuel pump inlet and another side to a portable gasoline container or the equipment fuel tank.
3. Turn on the key switch to activate the pump and check the system pressure on the gauge. If system pressure of 3 bar/ 43.5 psi is observed, the ignition switch, ECU, fuel pump, and pressure regulator are working properly. Turn the key switch off and depress the valve button on the tester to relieve the system pressure.

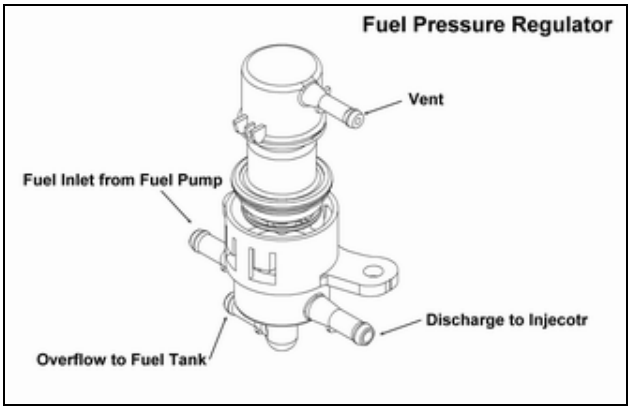
Normal Fuel Pressure: 3 Bar (300kpa)/ 43.5 psi.

4. If the pump did not activate, disconnect the harness connector from the fuel pump. Connect a DC voltmeter across terminals "A" and "B" in the plug on the vehicle harness side. Turn on the key switch and observe voltage to ensure a minimum of 10 volts is present.

NOTE: If the voltage was below 10 VDC, test the battery, ignition switch, relay(s), wiring harness and ECU.

FUEL PRESSURE REGULATOR OPERATION OVERVIEW

The fuel pressure regulator maintains the required operating system pressure of 3.0 bar. A rubber-fiber diaphragm divides the regulator into two separate sections; the fuel chamber and the pressure regulating chamber. The pressure regulating spring presses against the valve holder (part of the diaphragm), pressing the valve against the valve seat. The combination of atmospheric pressure and regulating spring tension equals the desired operating pressure. Any time the fuel pressure against the bottom of the diaphragm exceeds the desired (top) pressure; the valve opens, relieving the excess pressure, returning the excess fuel back to the tank.



FUEL PRESSURE REGULATOR TEST

Refer to the "Fuel Pump Test" procedure.

FUEL PRESSURE REGULATOR REPLACEMENT

The pressure regulator is a sealed, non-serviceable assembly. If it is faulty, the fuel pressure regulator must be replaced.

TPS OPERATION OVERVIEW

The throttle position sensor (TPS) is used to indicate throttle plate angle to the ECU.
Mounted on the throttle body and operated directly off the end of the throttle shaft, the TPS works like a rheostat, varying the voltage signal to the ECU in direct correlation to the angle of the throttle plate. This signal is processed by the ECU and compared to the internal pre-programmed maps to determine the required fuel and ignition settings for the amount of engine load.

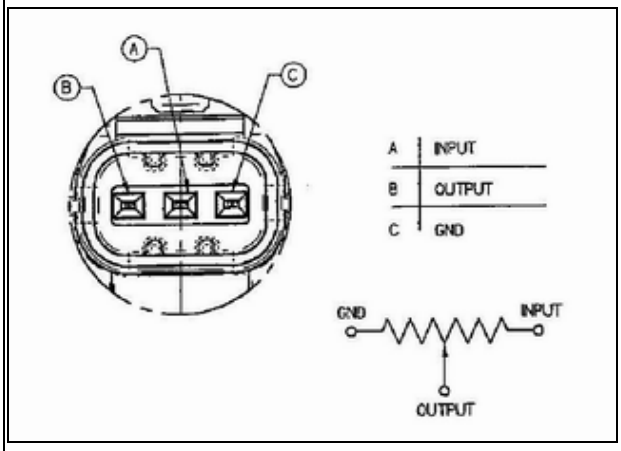
TPS TEST PROCEDURE

The throttle position sensor (TPS) is a non-serviceable item. If it is faulty, it must be replaced. It can be tested using the following method:

NOTE: Before proceeding with any of the following measurements or tests, it's extremely important to verify the throttle body bore is clean of any carbon build-up. Remove the intake boot and inspect the throttle body bore. If required, remove the throttle body and clean the bore-using carburetor cleaner.

1. Disconnect the vehicle harness from the TPS.

2. Plug the TPS tester into the TPS harness.



3. Connect the red voltmeter test probe in black/white port (A) and black voltmeter test probe in the blue port (C) and set the meter to read VDC.

4. The volt value reading should be around 5V.

5. Connect the red voltmeter test probe in red/green port and black voltmeter test probe in the blue port (C) and set the meter to read VDC.

6. Move the throttle open and closed slowly while reading the display. The voltage should increase and decrease smoothly with no “jumps” when the throttle is applied.

7. The volt value should be 0.15V~1.15V at idle throttle position.

8. The volt value should be 3.9V~4.9V at full throttle position.

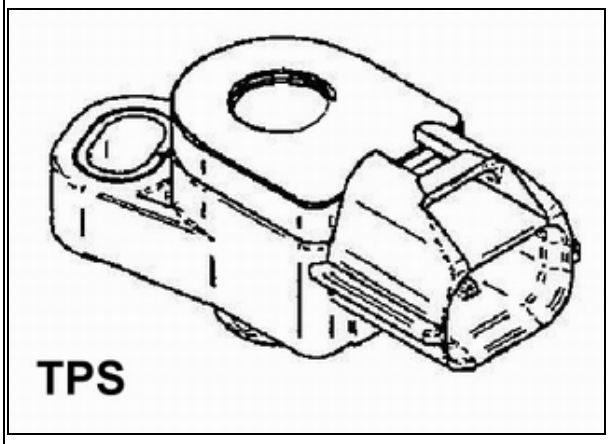
9. If the sensor did not function correctly, replace it.

TPS REPLACEMENT

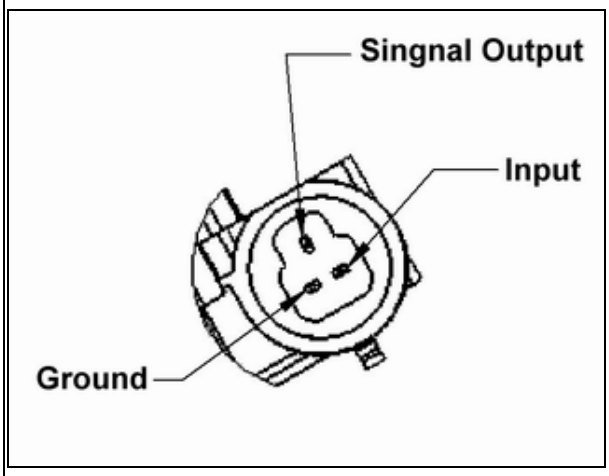
NOTE: The correct position of the TPS is established and set at the factory.

1. Disconnect TPS harness from throttle body

2. Remove screw from throttle body.



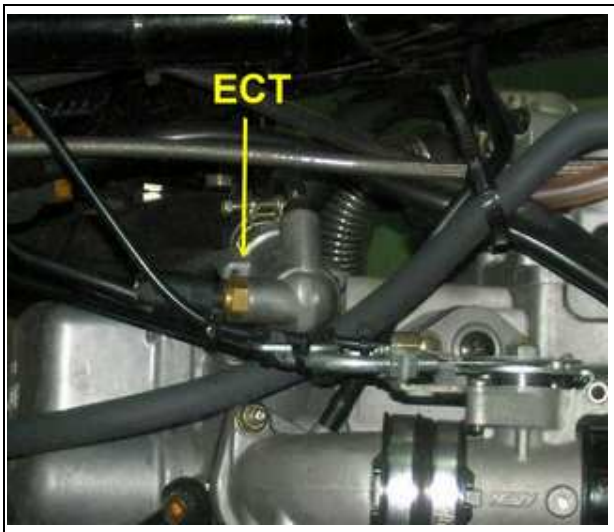
3. Carefully pull out TPS from throttle body.



4. Replace the TPS sensor.

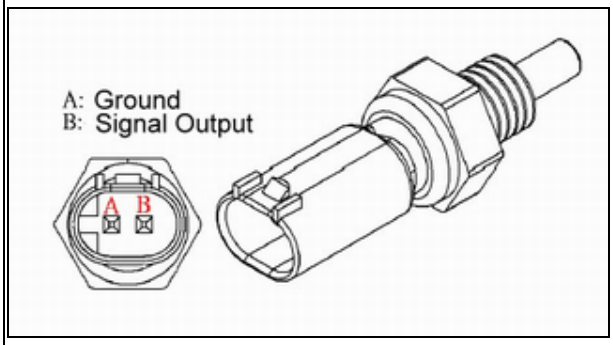
ECT OPERATION OVERVIEW

Mounted on the cylinder head, the engine temperature sensor measures coolant temperature. The engine temperature sensor is a Negative Temperature Coefficient (NTC) type sensor, as the temperature increases the resistance decreases.



Coolant passes through the cylinder and by the sensor probe, varying a resistance reading, which is relayed to the ECU. This signal is processed by the ECU and compared to its programming for determining the fuel and ignition requirements during operation. The ECU also uses this signal to determine when to activate the fan during operation. If for any reason the engine temperature sensor circuit is interrupted, the fan will default to "ON".

ECT SENSOR TEST



To quickly rule out other components and wiring related to the ETS, disconnect the harness from the ETS. The fan should turn on and 'HOT' should indicate on the instrument cluster. This indicates all other components are working properly.

ECT Resistance Specification:
10000±439Ω(25℃ / 77℉)

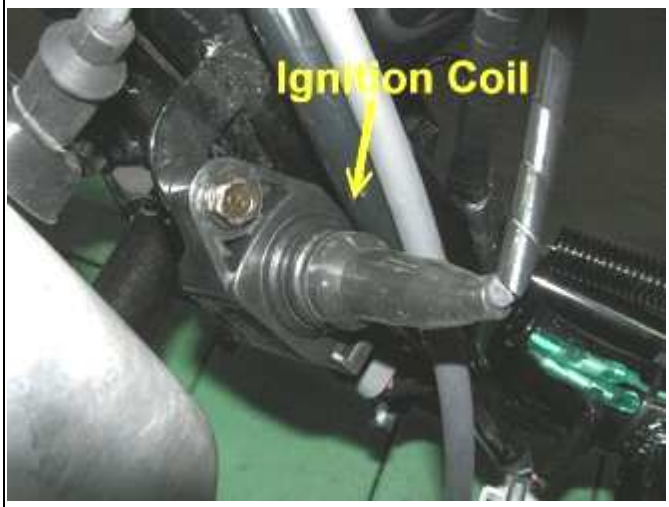
ECT SENSOR REPLACEMENT

1. Drain coolant to level below sensor.
2. Disconnect sensor from engine harness.
3. Using a wrench, remove and replace the sensor, applying a light coating of thread sealant to aid installation.
4. Torque the sensor to **20 Nm (15 ft. lbs.)**.

ECT Retaining Bolt Torque:
20 Nm (15 ft. lbs.)

IGNITION OPERATION OVERVIEW

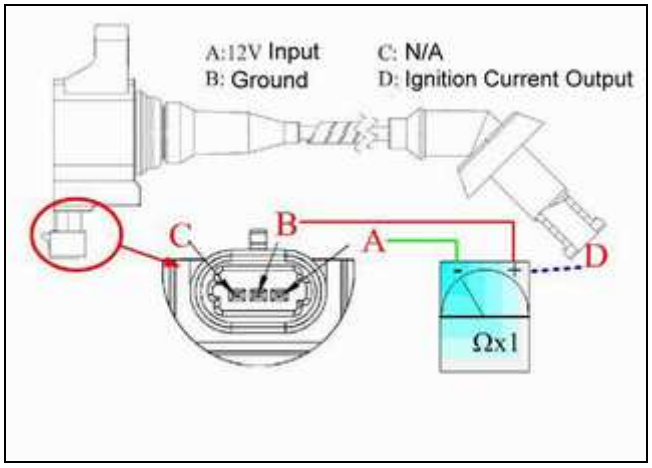
The ignition coil is used to provide high voltage to fire the spark plugs. When the ignition key is on, DC voltage is present in primary side of the ignition coil windings. During engine rotation, an AC pulse is created within the crankshaft position sensor for each passing tooth on the flywheel. The two-tooth gap creates an "interrupt" input signal, corresponding to specific crankshaft position for PTO cylinder. This signal serves as a reference for the control of ignition timing. The ECU then calculates the time interval between the consecutive pulses, and determines when to trigger the voltage spike that induces the voltage from the primary to the secondary coil windings to fire the spark plugs.



ELECTRONIC FUEL INJECTION

IGNITION COIL TEST

Using an ohmmeter can test the ignition coil. Use the following illustration and specification table to test the ignition coil.



1. Disconnect ignition coil from engine spark plug.
2. Connect the red voltmeter test probe in “B” port and black voltmeter test probe in the “D” and set the meter to read VDC.
3. Start the engine and the volt value should be around 2.5KV.
4. Disconnect ignition coil from engine and main harness.
5. Connect an ohmmeter between the “A” and “B” terminals. A resistance value of 0.7~1.3Ω at room temperature (25℃ / 77°F) should be obtained.
6. Connect an ohmmeter between the “A” and “B” terminals. A resistance value of 7KΩ~1.3KΩ at room temperature (25℃ / 77°F) should be obtained.

IGNITION COIL REPLACEMENT

1. Remove the seat.
2. Remove the storage box.
3. Disconnect ignition coil from engine spark plug and main harness.
4. Remove the fastener bolt and ignition coil.
5. Install the new ignition coil.

= T
Ignition Coil Retaining Bolt Torque: 8 Nm (71 in. lbs.)

DIAGNOSTIC “BLINK CODES”

NOTE: The EFI diagnostic mode is intended to quickly view the cause of the “Check Engine” light.

To recall blink codes (fail codes) from the ECU:

1. Verify the key switch is off and the transmission is in neutral with the parking brake applied.
2. Turn the key switch ON and OFF 3 times within 5 seconds and leave the key switch in the ON position on the third turn. The word “Wait” will appear as the ECU searches for blink codes.
3. Any “blink codes” stored in the ECU will display a numerical “blink code”, one at a time, in numerical order, on the instrument cluster display.
4. The word “End” and/or the number “61” will display after all of the codes have been displayed or if no codes are present.

ELECTRONIC FUEL INJECTION

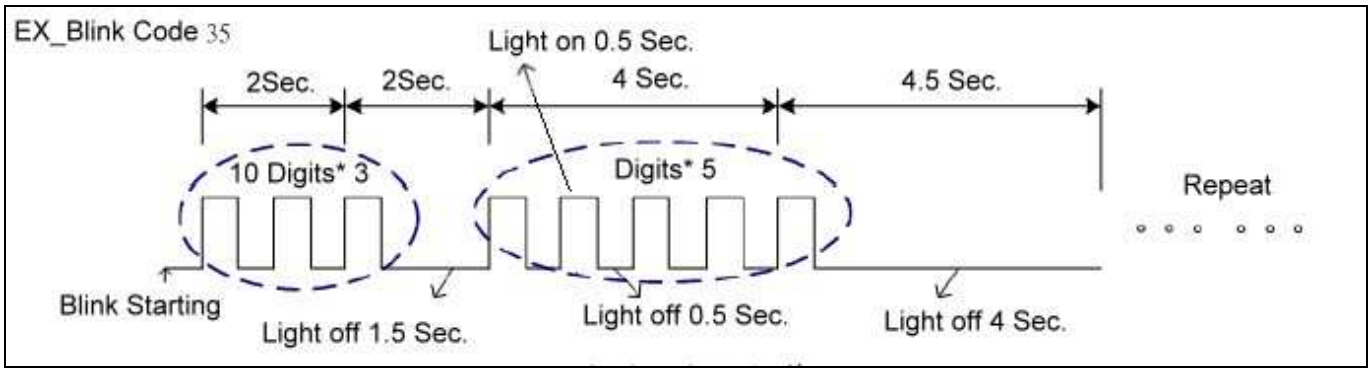
DIAGNOSTIC "BLINK CODES" CHART

SAE Code	BLINK Code	Description	Check Engine
P0106	91	Barometric Pressure Sensor: Intake Manifold air leak	YES
P0107	92	Barometric Pressure Sensor: Circuit Low Input	YES
P0108	93	Barometric Pressure Sensor: Circuit High Input	YES
P0112	94	Intake Air Temp Sensor: Short Circuit to Ground	YES
P0113	95	Intake Air Temp Sensor: Open or Short Circuit to ECU	YES
P0117	96	Engine Temperature Sensor Circuit: Short To Ground	YES
P0118	97	Engine Temperature Sensor Circuit: Open or Short to Battery	YES
P0563	98	Battery voltage overdue 14v	NO
P0122	12	TPS: Open or Short Circuit to Ground	YES
P0123	13	TPS: Short Circuit to Battery	YES
P0131	14	O2 Sensor: Short Circuit to Ground	NO
P0132	15	O2 Sensor: Open or Short to Battery	NO
P0134	16	O2 Sensor: Open Load	NO
P0231	17	Fuel Pump: Short Circuit to Ground	NO
P0232	18	Fuel Pump: Open or Short to Battery	NO
P0601	19	RAM Error: Defective ECU	YES
P0261	21	Injector: Short Circuit to Ground	YES
P0262	23	Injector: Open or Short to Battery	YES
P1351	24	Ignition Coil: Short Circuit to Ground	YES
P0351	25	Ignition Coil: Open or Short to Battery	YES
P1650	26	Diagnostic Lamp: Short Circuit to Ground	YES
P0650	27	Diagnostic Lamp: Open or Short to Battery	YES
P1654	28	Speedometer: Short Circuit to Ground	NO
P0654	29	Speedometer: Open or Short to Battery	NO
P0335	38	Loss of Synchronization	YES
P1335	49	Crank Position Sensor: Open Load	YES
P0135	51	O2 Heater: Open or Short to Battery	NO
P1135	52	O2 Heater: Short Circuit to Ground	NO
P0508	36	Idle Air Controller: Short Circuit to Ground	NO
P0509	37	Idle Air Controller: Open or Short to Battery	NO
P1500	48	Rollover Switch: Switch connected	NO

BLINK CODE BREAKOUT DIAGRAMS

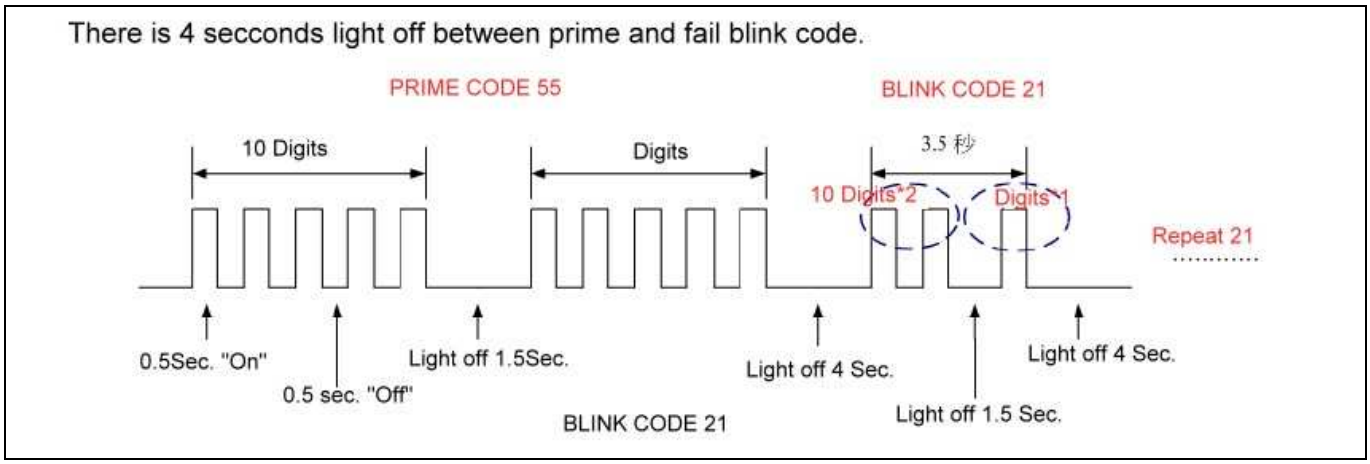
BLINK CODE RECOGNITION

The blink code is 10 digits numbers. The blink light location on left of the speedometer display screen as show above.
For example while Blink Code 35. The blink light stat twinkling 3 times then light off for 1.5 seconds and twinkling 5 times.



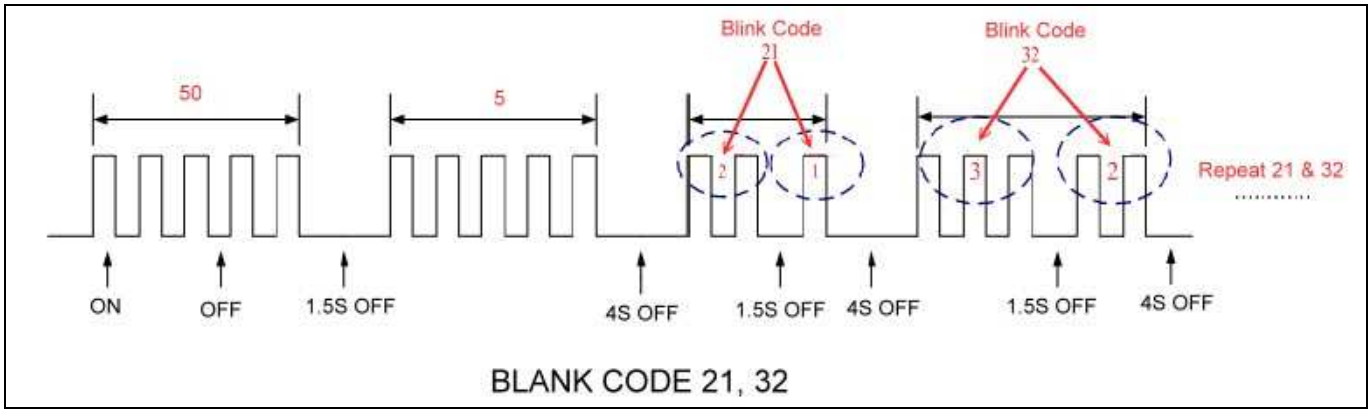
PRIME CODE

Every diagnostic by blink code there is a prime code showing before fail blink code. The prime code is always “55” which set in factory. For example if blink code shows as number 21. The blink code should be like below.



MORE THAN 1 FAILS BLINK CODE

If there are two fail blink codes like 21 and 32. The light should twinkle prime code “55” first than “21” and “32”. Cycle repeat just “21” and “32”. Shows as below.



EFI TROUBLESHOOTING

Fuel Starvation / Lean Mixture

Symptoms: Hard start or no start, bog, backfire, popping through intake / exhaust, hesitation, detonation, low power, spark plug erosion, engine runs hot, surging, high idle, idle speed erratic.

- No fuel in tank
- Restricted tank vent, or routed improperly
- Fuel lines or fuel injectors restricted
- Fuel filter plugged
- Fuel pump inoperative
- Air leak in system
- Intake air leak (throttle shaft, intake ducts, airbox or air cleaner cover)
- Incorrect throttle stop screw adjustment

Rich Mixture

Symptoms: Fouls spark plugs, black, sooty exhaust smoke, rough idle, poor fuel economy, engine runs rough/ misses, poor performance, bog, engine loads up, backfire.

- Air intake restricted (inspect intake duct)
- Air filter dirty/plugged
- Poor fuel quality (old fuel)
- Fouled spark plug
- TPS setting incorrect
- Injector failure

Poor Idle

Symptom: Idle Too High (If greater than 1300 RPM when engine is warm)

- Throttle stop screw set incorrect
- Throttle cable sticking, improperly adjusted, routed incorrectly

Symptom: Idle Too Low (if less than 900 RPM when engine is warm)

- Plugged air filter
- Leaking injector (rich condition)
- Belt dragging
- Throttle stop screw tampering

Symptom: Erratic Idle

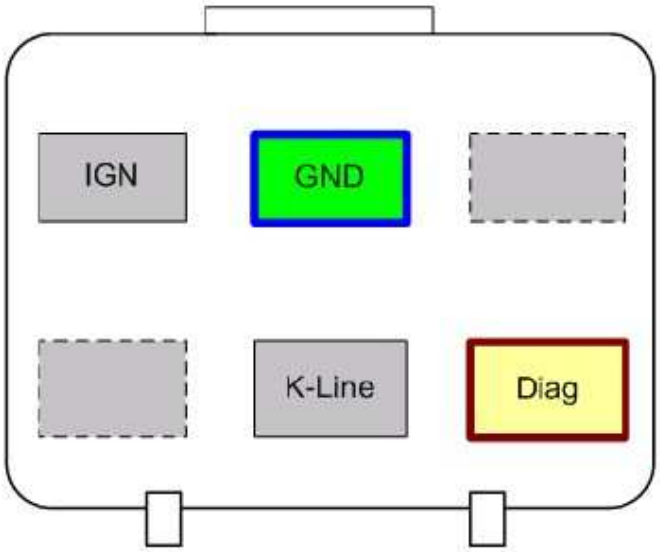
- Throttle cable incorrectly adjusted
- Air Leaks, dirty injector
- TPS damaged or adjusted
- Tight valves
- Ignition timing incorrect
- Belt dragging
- Dirty air cleaner
- Engine worn
- Spark Plug fouled
- Throttle stop screw set incorrectly (out of sync with ECU)

KWP DIAGNOSTIC TOOL

KWP Diagnostic Tool that transfer ECU diagnosis data to PDA or computer by K-Line. There are 7 majors mode to monitor engine system failure.

1. **Engine data**
2. **ECU version**
3. **Malfunction code**
4. **Malfunction history**
5. **Malfunction record**
6. **Freeze frame**

DIAGNOSTIC HARNESS



Diagnostic Harness

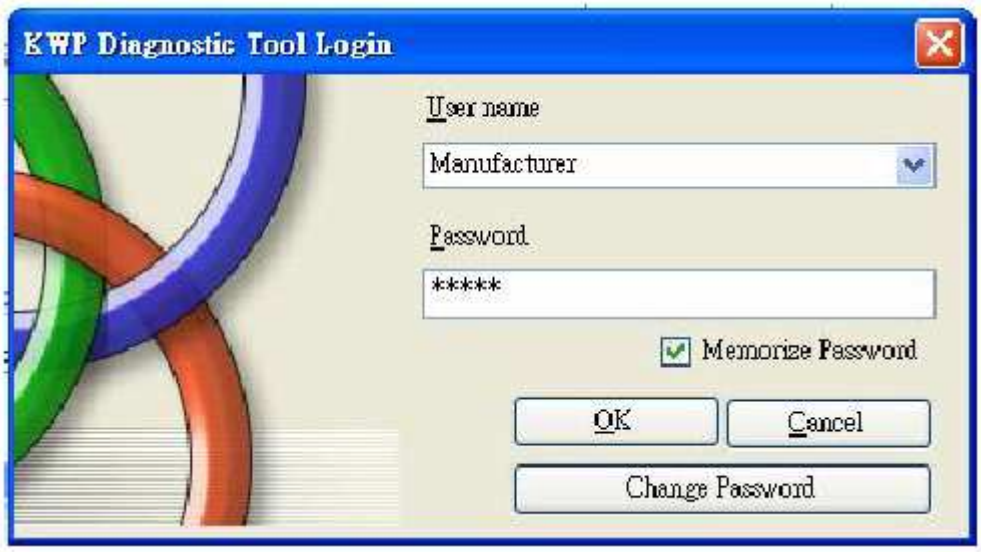
Terminal	Description	ECU Terminal
IGN	Connect with ignition key switch	Pin 8
GND	Ground	Pin 26
K-Line	N/A	Pin 2

DIAGNOSTIC TOOL

Diagnostic Tool PC interface cable	RS232/USB Conversion Cable

SYSTEM LOGIN

Plug in the communication cable to the diagnostic connector, turn on the key switch, execute the diagnostic software, select User name as "Manufacturer" and key in Password to login.



1. "Connection" and "Convert Log File" will be shown before connection. Press "Connection" to start.

ELECTRONIC FUEL INJECTION

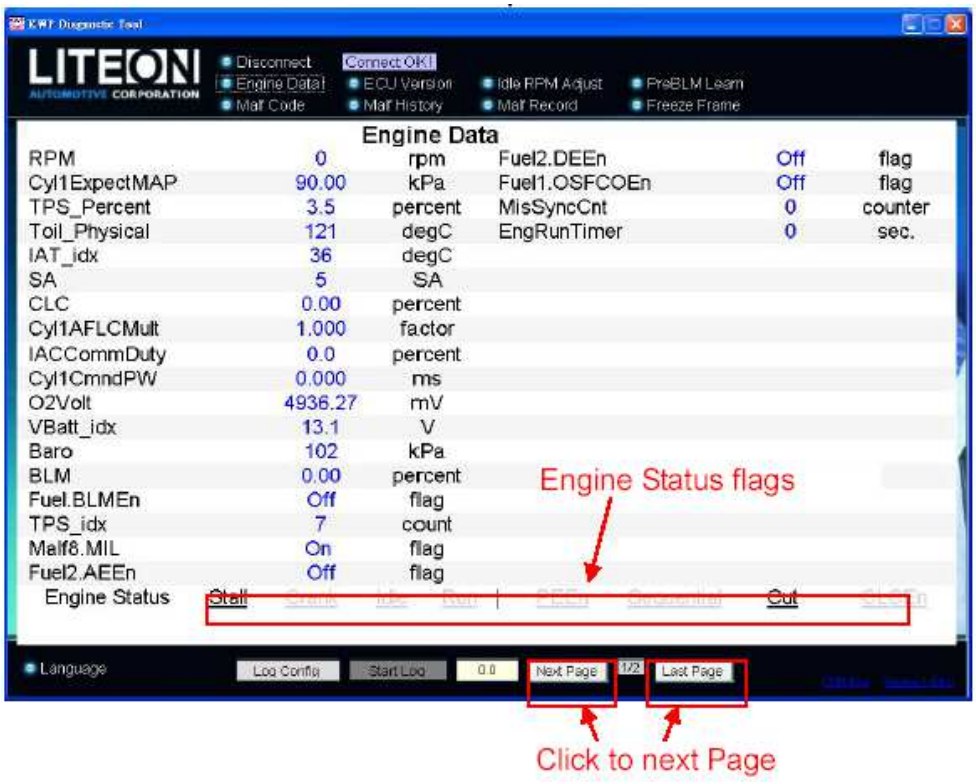
2 Eight options including “Engine Data”, “ECU Version”, “Idle RPM Adjust”, “PreBLM Learn”, “Malf Code”, “Malf History”, “Malf Record” and “Freeze Frame” will be shown after pressing “Start Connection”

ELECTRONIC FUEL INJECTION

LITEON
AUTOMOTIVE CORPORATION
Disconnect
Connect OK!
Engine Data
ECU Version
Idle RPM Adjust
PreBLM Learn
Malf Code
Malf History
Malf Record
Freeze Frame
Liteon Group
The Lite-On Group is one of Taiwan's leading IT manufacturers. Many of our products have been ranked in first place globally. The Lite-On Group has approximately 50 thousand employees and annual turnover of over US$ 5.2 billion.
Language

ENGINE DATA

Two (2) pages of Engine running parameters will be shown under "Manufacturer" category. Besides, engine status will be shown on the bottom of screen, including "Stall", "Crank", "Idle", "Run", "PEEn", "Sequential", "Cut" and "CLCEn".

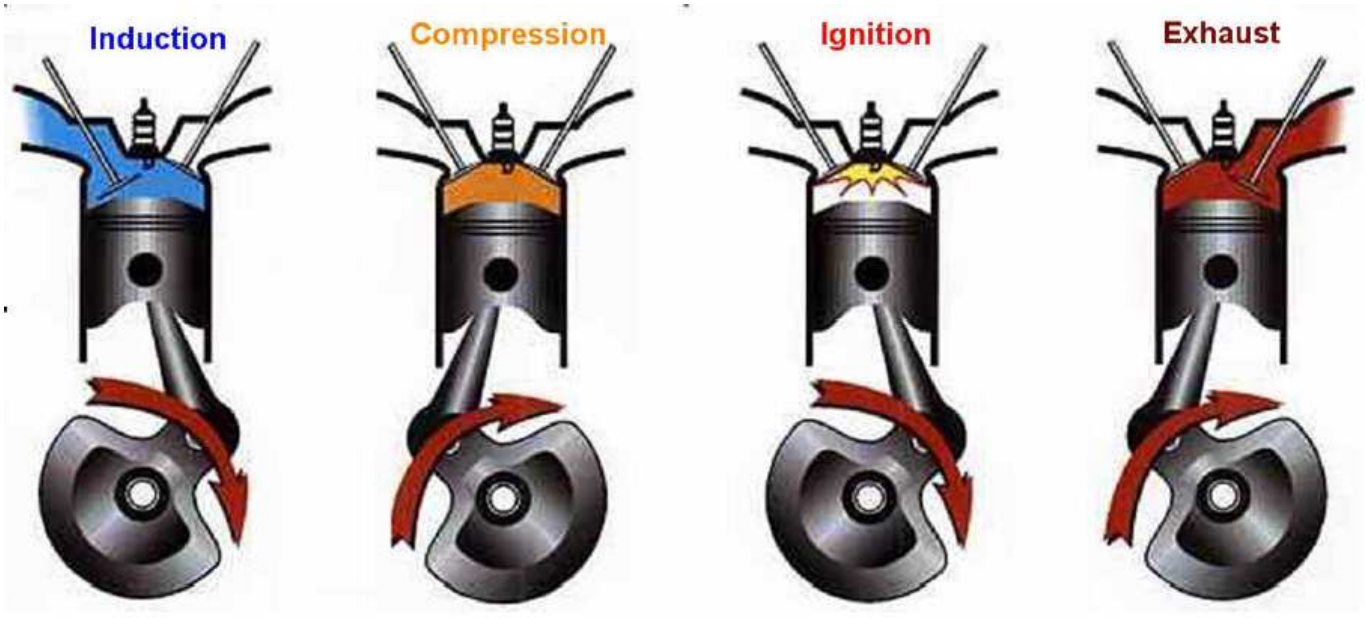


ENGINE PARAMETER DEFINITION

RPM (Engine Running Speed)

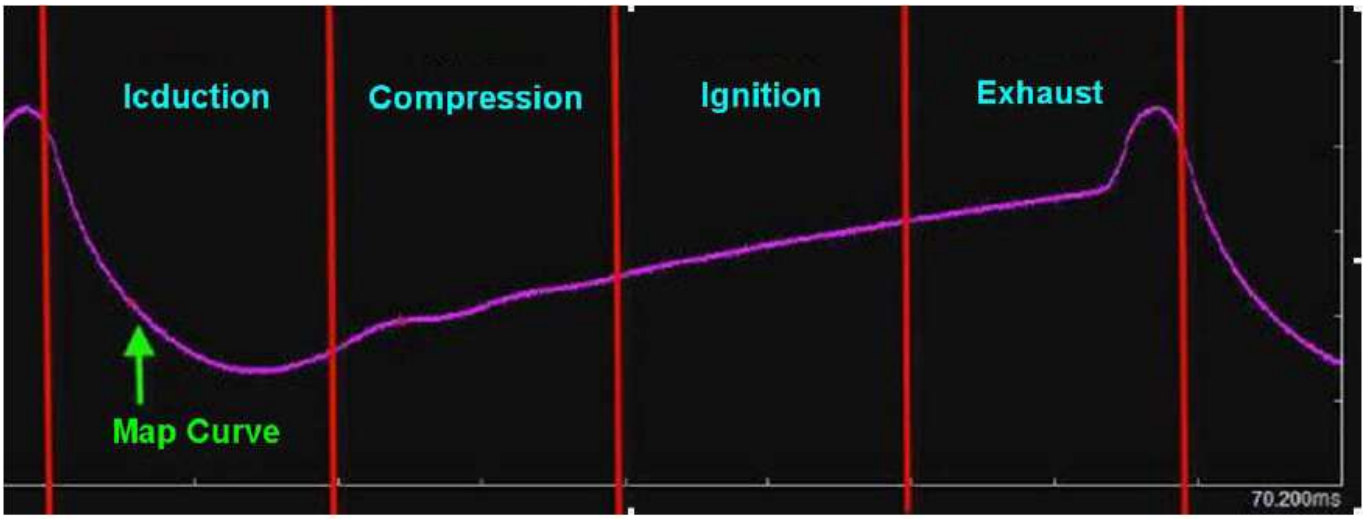
Every complete cycle of a 4-stroke engine requires 2 revolutions, including 4 processes of intake, compress, ignition and

exhaust.



MANIFOLD PRESSURE

The manifold pressure measured during intake process



TPS_percent (THROTTLE OPENING PERCENT)

This refers to the percentage of the throttle opening. It is 0% when throttle plate full closed and is 100% when throttle plate open up to 80% and above.

Toil_physical (ENGINE TEMPERATURE)

This refers to the metal or coolant temperature of cylinder head. It is used as the reference of engine operation condition.

IAT_idx (INTAKE AIR TEMPERATURE)

This refers to the air temperature measured on air cleaner or intake pipe.

SA (SPARK ANGLE)

ELECTRONIC FUEL INJECTION

TDC is set as the 9th tooth of target wheel aiming the center of crank sensor. Spark angle refers to the ignition angle before the 9th tooth.

Cyl1AFLCMult (FLOW ADJUSTMENT COEFFICIENT)

This refers to the adjustment factor according to the change of intake airflow.

IACCommDuty (IDLE AIR CONTROL VLAVE OPENING)

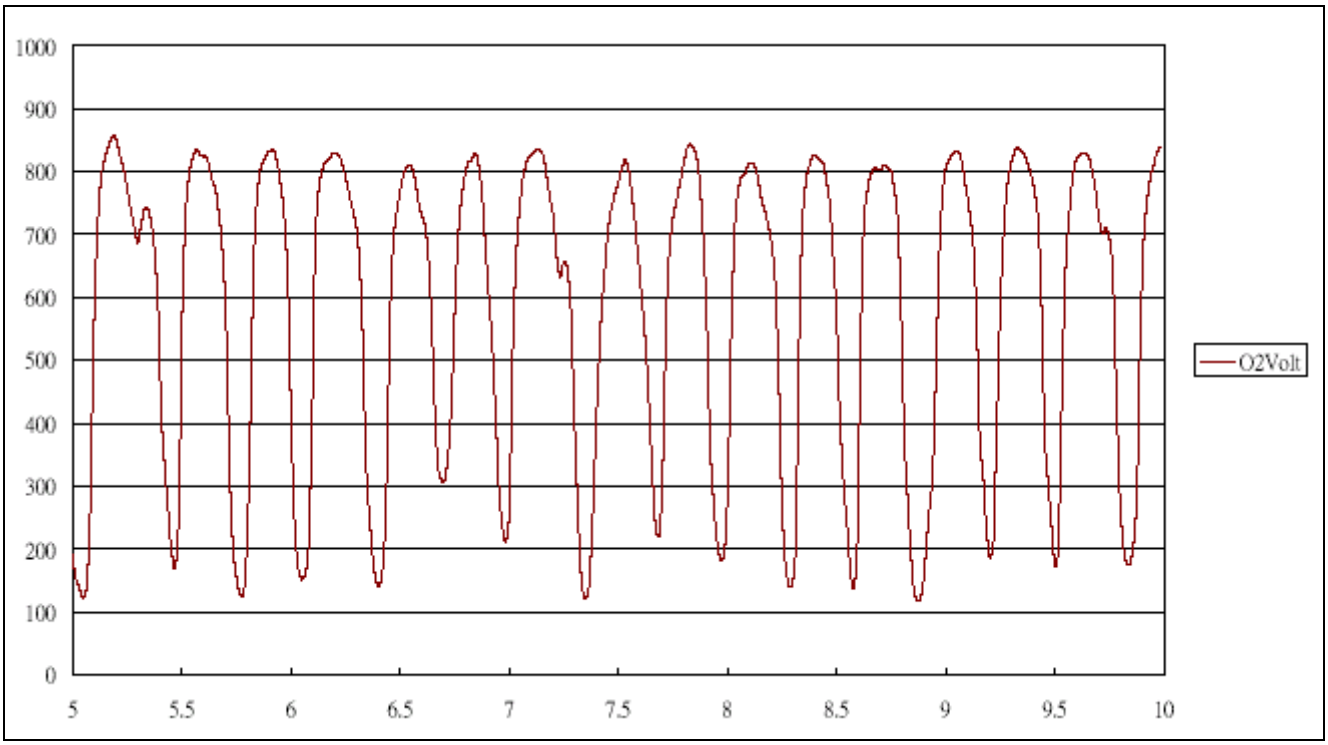
This refers to the percentage of the idle valve opening. It ranges from 0% to 99.6%.

Cyl1CmndPW (BASE PULSE WIDTH (BPW))

The unit of BPW is mini second. ECU will calculate and determine the BPW according to related parameters such as engine rpm, intake and engine temperatures and throttle opening, etc.

O2 Volt (OXYGEN SENSOR VOLTAGE)

The voltage of Oxygen sensor will range from 100 to 800mV and will oscillate during normal operation.



VBatt_idx (BATTERY VOLTAGE)

The voltage of battery that normally will be range from 13 to 14.5V after engine start.

Baro (BAROMETRIC PRESSURE)

This refers to the current atmospheric pressure being measured. As reference, the atmospheric pressure is 101.3kPa at sea level and is 69kPa at altitude of 3250m.

CLC (CLOSE-LOOP CONTROL)

This refers to the air-to-fuel ratio (AFR) being controlled around stoichiometry point (AFR=14.6).

BLM (BLOCK LEAN MEMORY)

The values will be close-loop corrected according to the changes of engine efficiency.

Fuel.BLMEn (BLOCK LEAN MEMORY MODE ENABLE)

This mode will be activated under engine fully warm-up condition.

TPS_idx (THROTTLE POSITION OPENING)

Throttle position opening is a digitized unit transferred from throttle opening to be used by micro-controller. It will be zero (0) when ignition key turned on (engine not started). If the value is not zero then it can be a learning error of throttle position. Turn off the ignition key for two (2) seconds and turn on again to get a correct value.

Malf8.MIL (MAL-FUNCTION INDICATION LIGHT)

The MIL will be turned on whenever the EMS component becomes mal-functioned during engine operation. MIL can also be

ELECTRONIC FUEL INJECTION

used for mal-function code reading.

Fuel2.AEEn (ACCELERATION MODE ENABLE)

It refers to the operation conditions that additional fuel will be supplied to engine combustion so as to obtain better vehicle acceleration.

Fuel2.DEEn (DECELERATION MODE ENABLE)

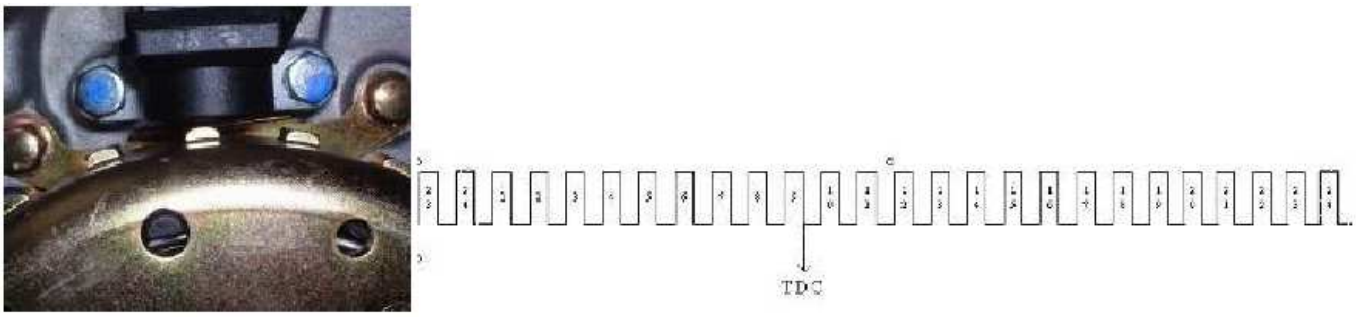
It refers to the operation conditions that less fuel will be supplied to engine combustion so as to avoid AFR from too rich.

Fuel1.OSFCOEn (OVER-SPEED FUEL CUT OFF MODE ENABLE)

This is used for engine protection from over speed operation.

MisSyncCnt (MISSING-COUNTER DETECTION)

The gap between target wheel and crank sensor is 0.8mm nominal. Missing-count will happen should the gap be larger or smaller than tolerance. This will also happen if there are burrs or metal filings on the teeth of target wheel.



EngRunTimer (ACCUMULATED VEHICLE OPERATION TIME)

This refers to the accumulated time after the engine being started most lately.

AFR (TARGET AFR)

This refers to the AFR values set up in the ECU. The target AFR value will normally be 14.6 except the conditions of starting, transient and power mode,

IdleDesRPM (IDLE DESIGN RPM TARGET)

This refers to target revolution in idle condition. It will vary according to different ambient and engine temperatures.

IdleRPMErr (DELTA OF IDLE DESIGN RPM)

This refers to the difference between actual and target rpm values.

Fuel3.PumpOn (FUEL PUMP STATUS)

This is the indication whether the fuel pump is in operation.

Cyl1FinalVE (FINAL VOLUMETRIC EFFICIENCY)

This refers to the efficiency of intake air volume.

Cyl1MAP_idx (INDICATION VALUE OF MANIFOLD PRESSURE)

This refers to the default value set up in the ECU. The default values will be used in case of pressure sensor mal-function.

Cyl1AFLCFilteredMAP (MANIFOLD PRESSURE READINGS)

This refers to the actual measuring values from the pressure sensor.

ColdCyl1VEFactorIdle (IDLE MODE VOLUMETRIC EFFICIENCY COEFFICIENT)

This refers to the BPW correction value according to different temperature in idle condition.

ColdCyl1VEFactorRun (RUN MODE VOLUMETRIC EFFICIENCY COEFFICIENT)

This refers to the BPW correction value according to different temperature in operation.

TPSLean (INITIAL LEANING VALUE OF THROTTLE POSITION)

This refers to the learning value at zero (closed) throttle position

TPS_AD (ANALOG TO DIGITAL OF THROTTLE POSITION SENSOR)

This refers to the digitized value according changes of throttle position. The value will be 255 if the sensor or its circuitry is short to power, and will be 0 when open or short to ground.

AFRChokeIdle (IDLE MODE AFR CHOKE)

This is a simulation to the idle choke function similar to carburetor system.

AFRChokeRun (RUN MODE AFR CHOKE)

This is a simulation to the operation choke function similar to carburetor system.

AFRChokeDecayCounter (AFR CHOKE COUNTER)

This refers to the time after the engine start. It's a calibration value according to different engine temperature.

PreBLM (PRE-BLOCK LEAN MEMORY)

It refers to the automotive correction with the learning function at vehicle off-line if the engine variance over certain level.

SAIdleDyn (IDLE SPARK ANGLE CORRECTION)

The correction is made according to the difference to target rpm in idle condition.

AFCorrectionState.EnableCondMet (AIR FLOW CORRECTION MODE)

This refers to the indication of opening of the mode.

IAT_AD (ANALOG TO DIGITAL OF IAT SENSOR)

This refers to the digitized value according changes of intake air temperature. The value will be 0 the sensor or its circuitry is short to ground, and will be 255 if open or short to power.

Toil_AD (ANALOG TO DIGITAL OF CLT SENSOR)

ELECTRONIC FUEL INJECTION

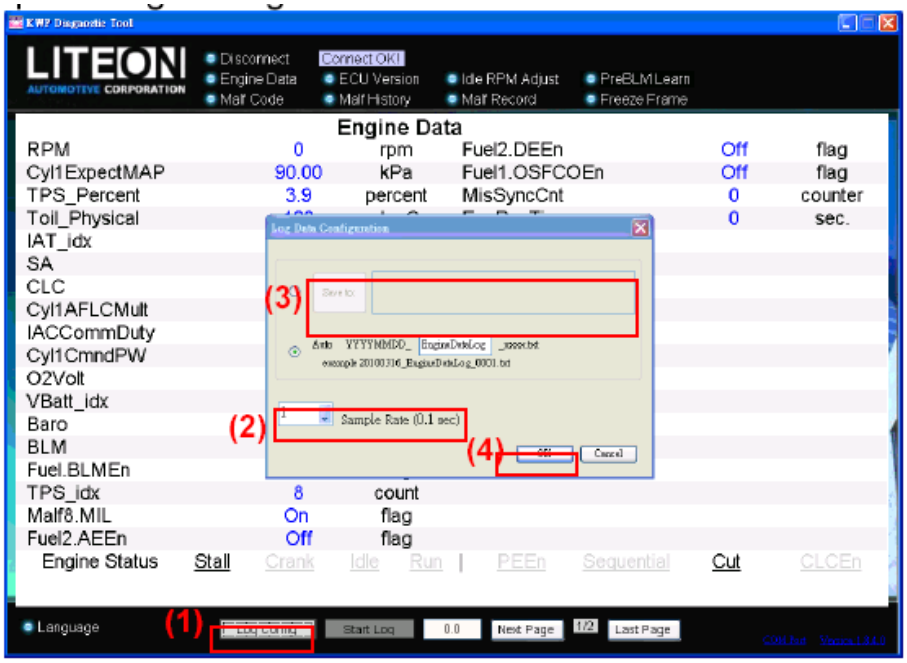
This refers to the digitized value according changes of engine temperature. The value will be 0 the sensor or its circuitry is short to ground, and will be 255 if open or short to power.

BLMCellNum (BLM CELL NUMBER)

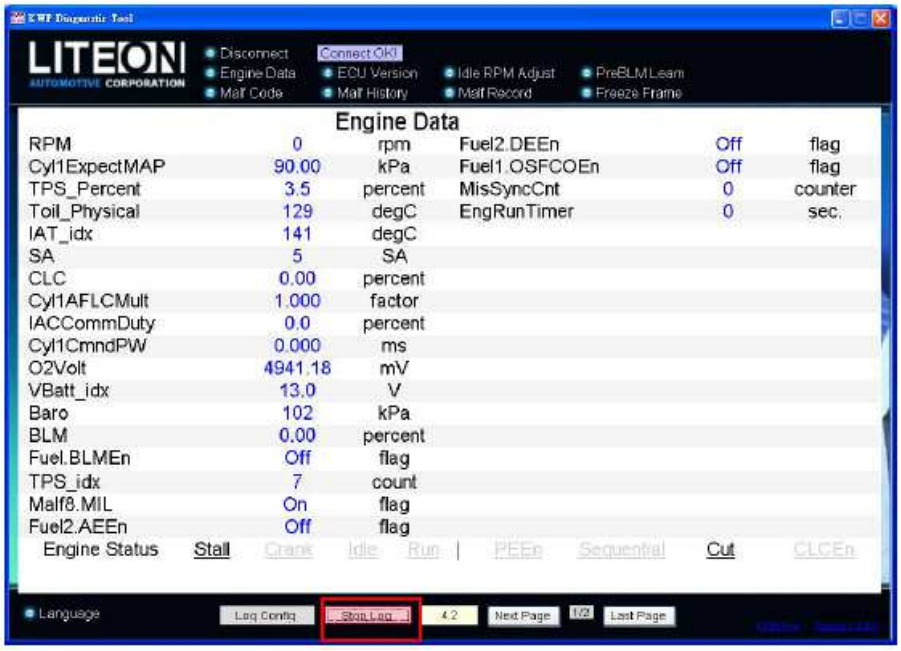
This refers to the memory address of engine under various rpm and throttle position.

RECORDING OF ENGINE OPERATION PARAMETERS

The procedure of the engine operation parameters are : (1) press "Log Config"; (2) Choose "Sampling Rate" (Period); (3) set up "Save to" and the default will be C:**\Program Files\KWP TOOLS\ DiagTool\Log**) if no route being set; (4) press "OK" to complete Log-Config.



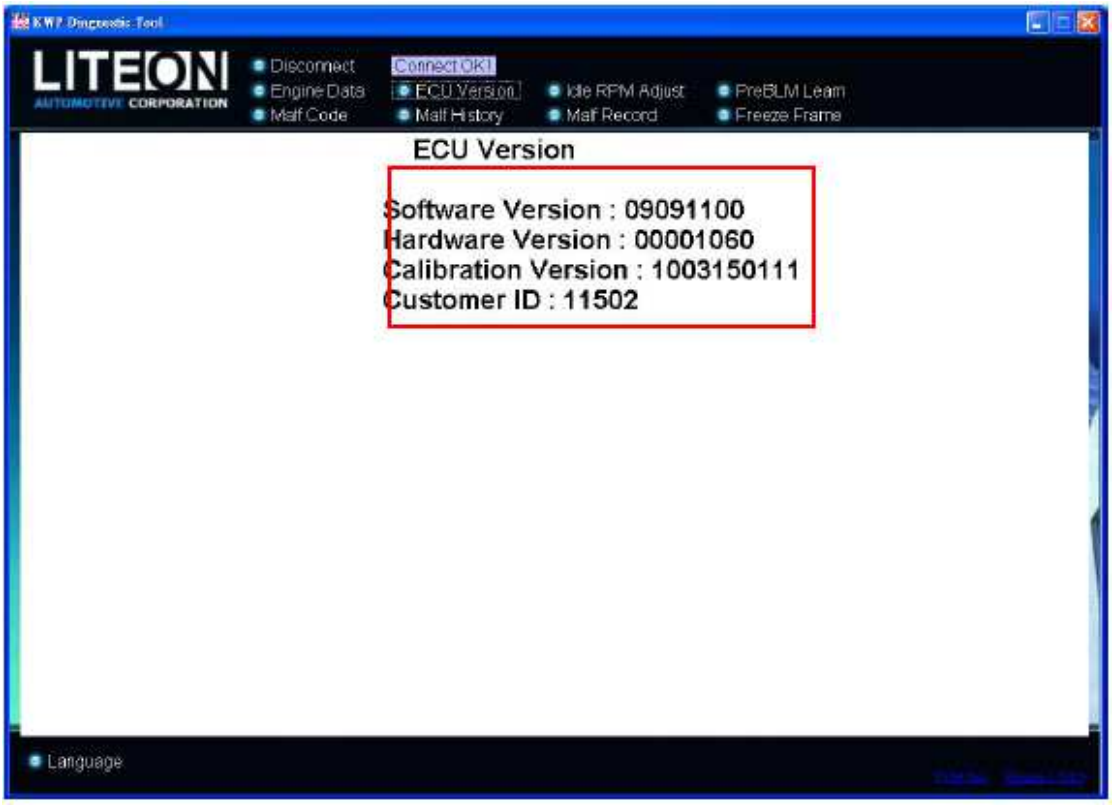
System will start logging engine parameters and display recording timer. Press "Stop Log" after the completion of recording.



ELECTRONIC FUEL INJECTION

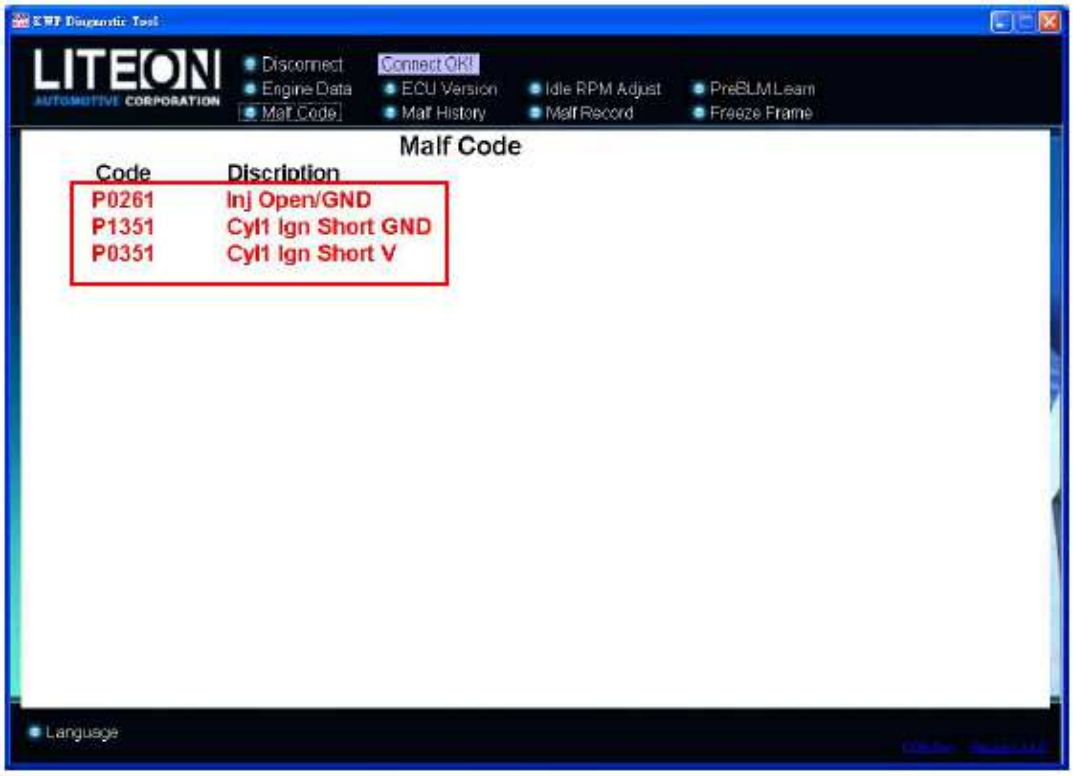
ECU Version

This is to show the software, hardware and calibration versions and ECU ID (vehicle code) of the ECU.



Malf Code

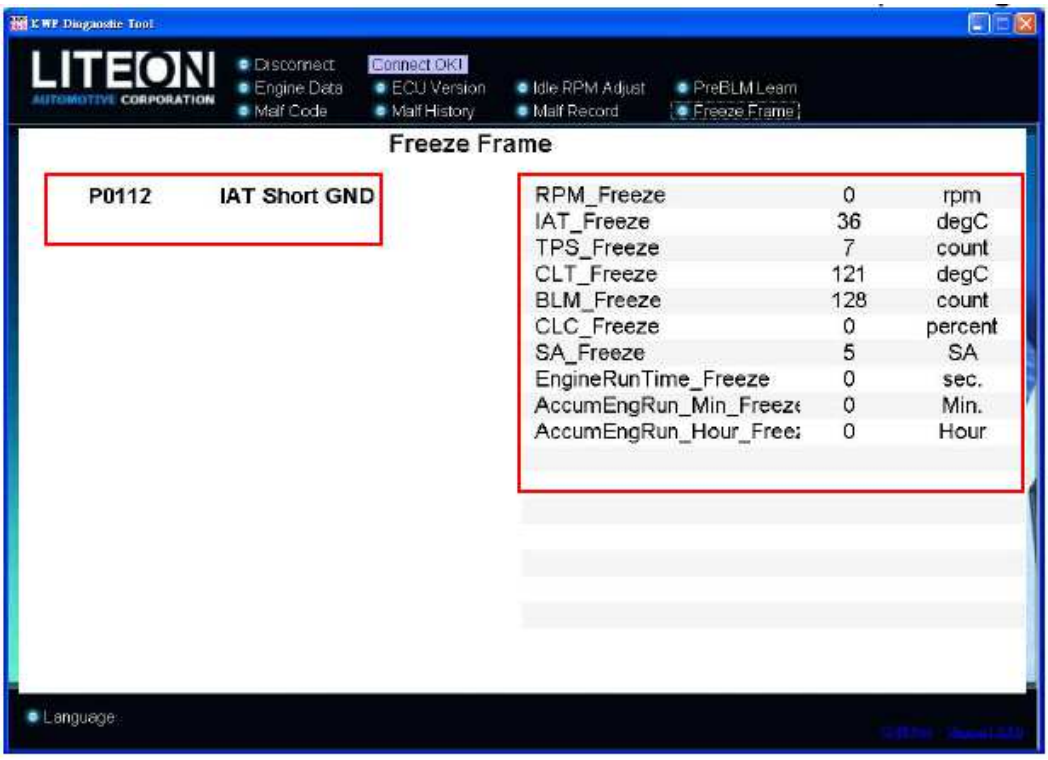
This is to show the mal-function codes occurred to the vehicle.



ELECTRONIC FUEL INJECTION

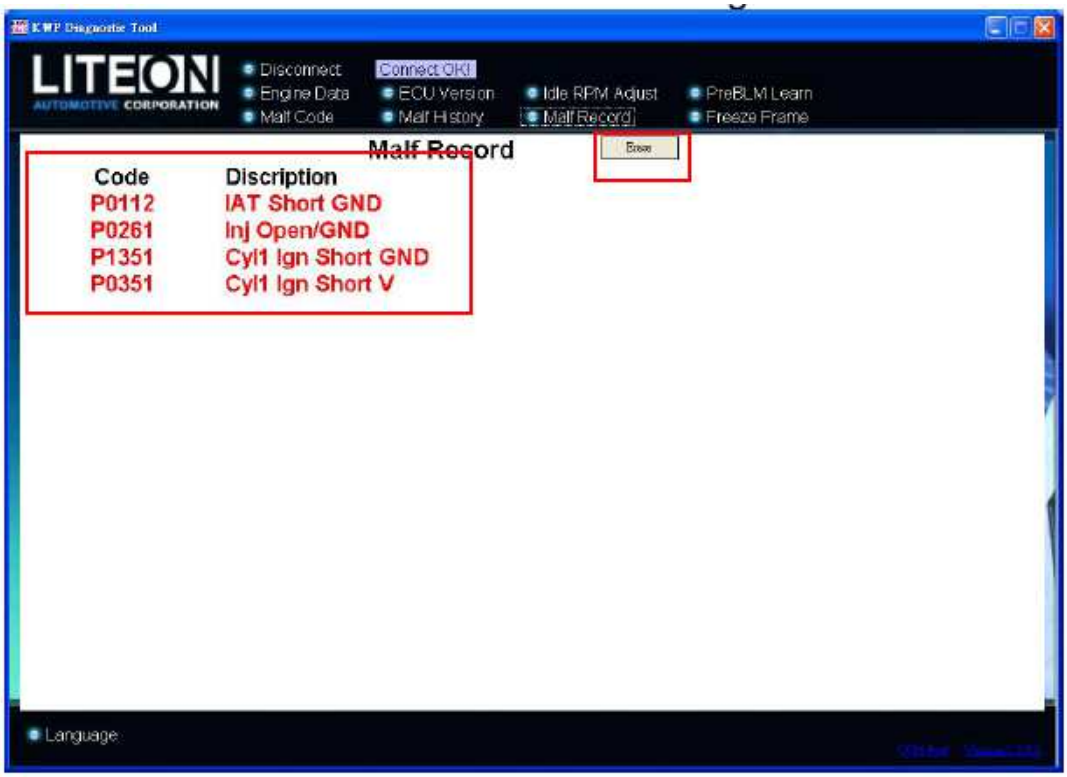
Freeze Frame

This is to show the latest mal-function occurred and its corresponding engine status.



Malf Record

This is to record all mal-functions have ever occurred to the vehicle. Press “Erase” to eliminate mal-function codes after mal-function being solved.



ELECTRONIC FUEL INJECTION

Malf History

This is to show the mal-function codes have ever occurred after the ECU key-on. The codes will be cleared after ECU key-off.

Idle RPM Adjust

This is to carry out idle adjustment after vehicle off the line. The adjustment of "idle adjust screw" will be done as first priority. SA adjustment will then be used if the idle adjust screw has been rotated for more than 2 turns.

The following conditions need to be met in idle adjustment:

1. No mal-function codes as below

P0112 (IAT grounded)

P0113 (IAT short / open)

P0117 (CLT grounded)

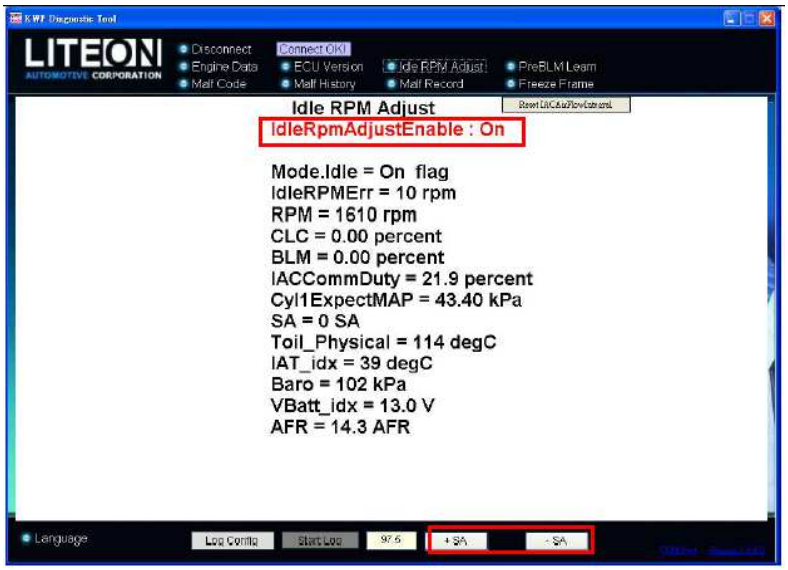
P0118 (CLT short / open)

2. Engine in idle mode

3. In take air temperature within specified range

4. Engine temperature within specified range

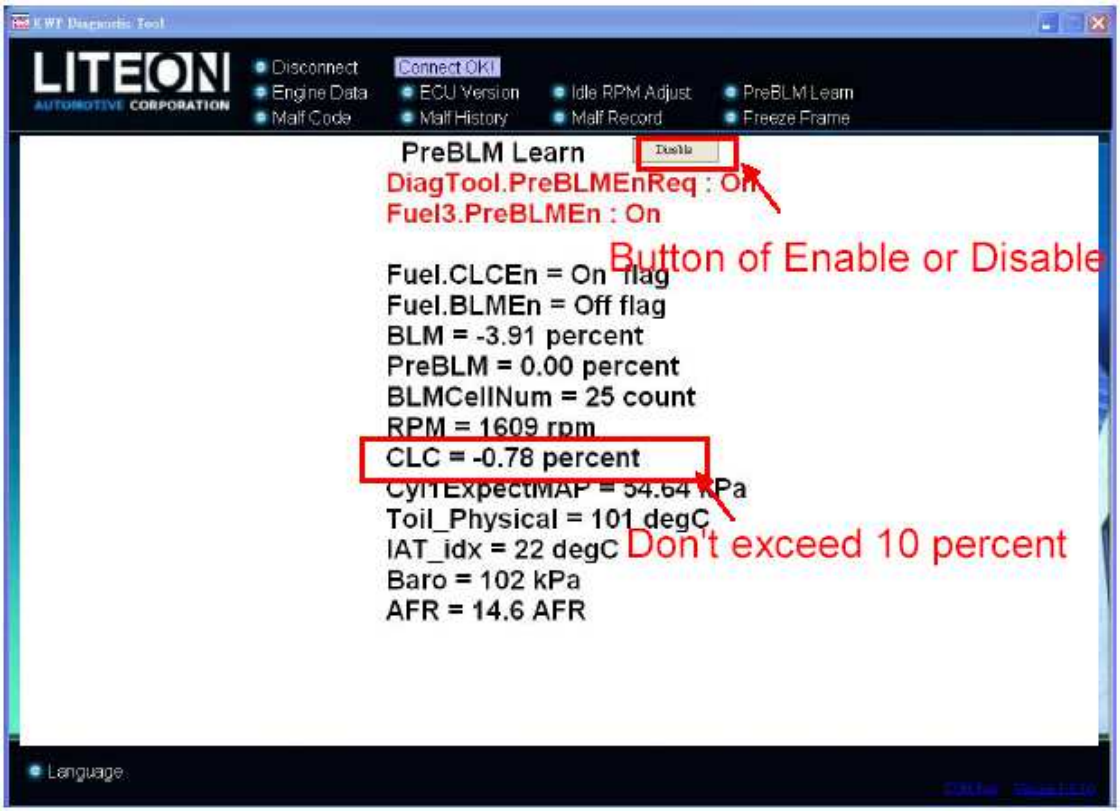
5. Diagnostic tool in connection



ELECTRONIC FUEL INJECTION

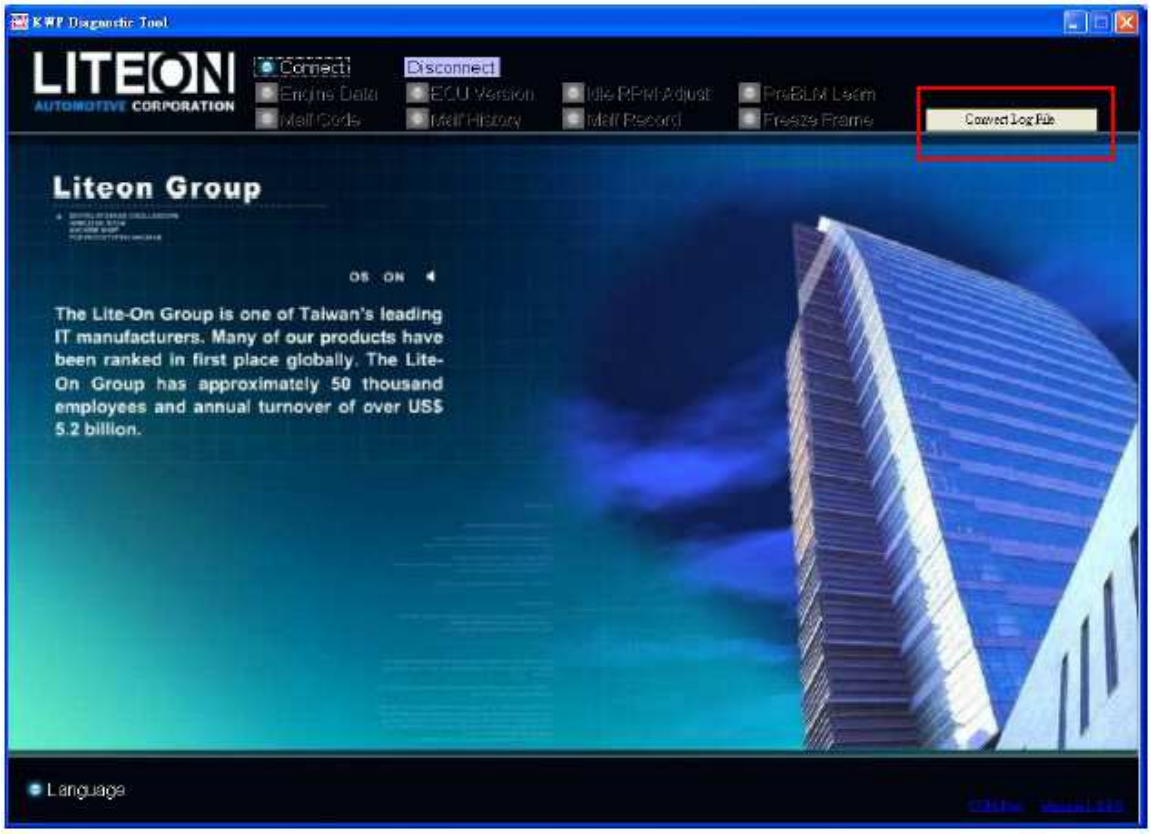
PreBLM Learn

This function can be used when it exceeds ±10% of “close-loop control” under engine fully warm-up.

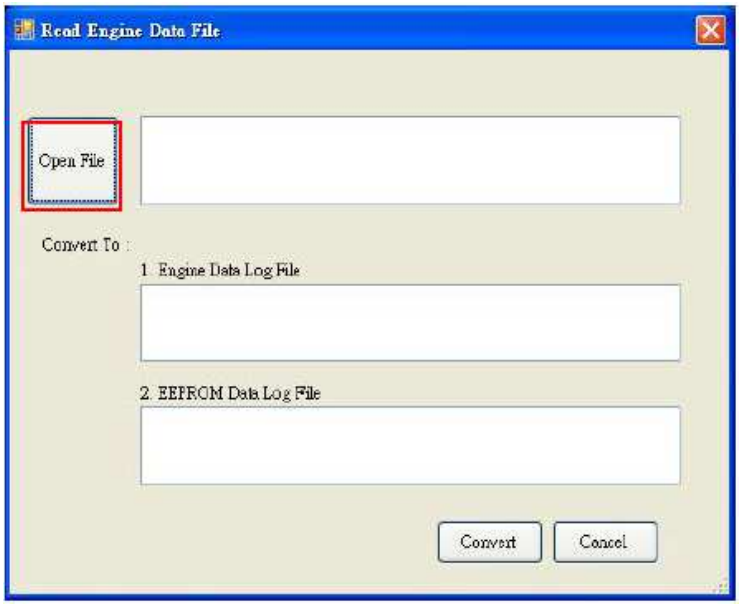


Convert Log File

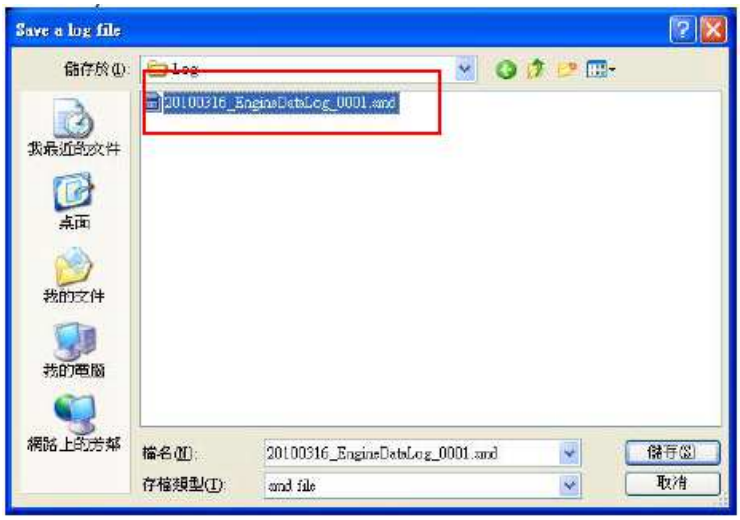
1. Press “Convert Log File” under “Not connected” condition.


KWP Diagnostic Tool
LITEON
AUTOMOTIVE CORPORATION
Connect
Disconnect
Engine Data
ECU Version
Idle RPM Adjust
PreBLM Learn
Malf Code
Malf History
Malf Record
Freeze Frame
Convert Log File
Liteon Group
The Lite-On Group is one of Taiwan's leading IT manufacturers. Many of our products have been ranked in first place globally. The Lite-On Group has approximately 50 thousand employees and annual turnover of over US$ 5.2 billion.
Language

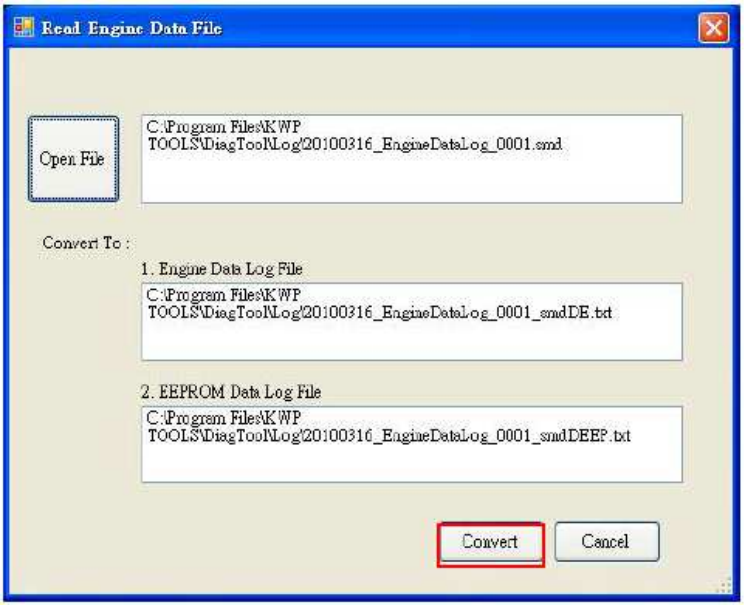
2. Press “Open File”



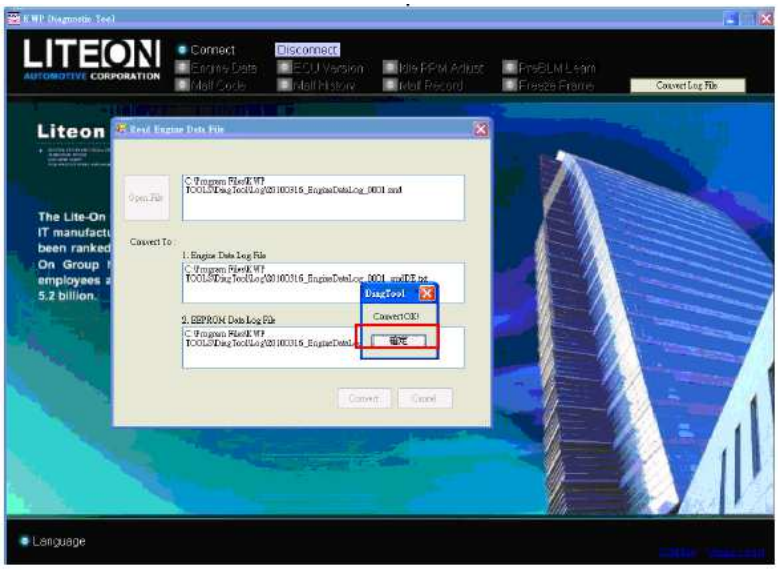
3. Select file (smd format)



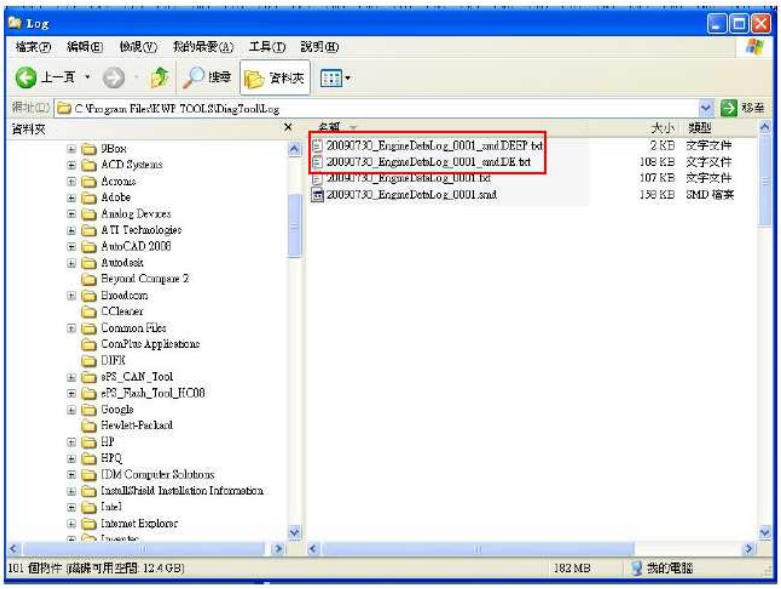
4. Press “Convert”



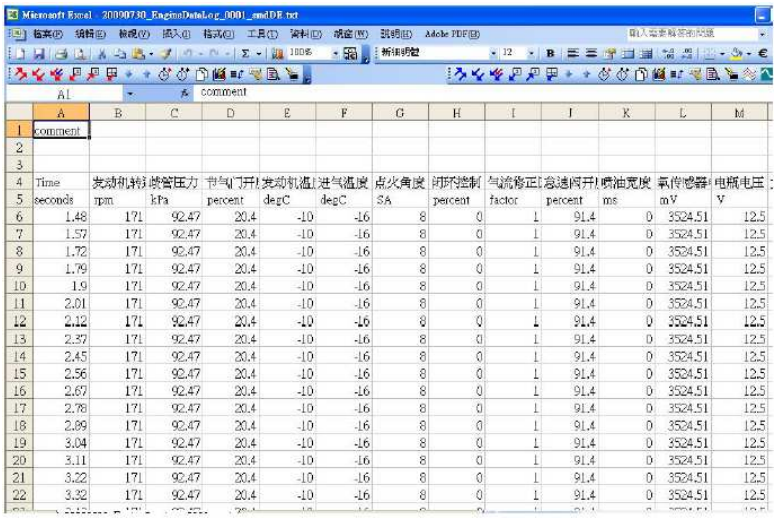
5. Press “Confirm” after transformation completed



6. 2 new files ("_smdDE.txt" and "_smdDEEP.txt") will be added to the recorded archive. Open "_smdDE.txt" to check all records.



7. Use Excel to open the records will see all the data.



	A	B	C	D	E	F	G	H	I	J	K	L	M
1	comment												
2													
3													
4	Time	发动机转	喷管压力	节气门开	发动机温	进气温度	点火角度	闭环控制	气流修正	怠速阀开	喷油宽度	氧传感器	电瓶电压
5	seconds	rpm	kPa	percent	degC	degC	SA	percent	factor	percent	ms	mV	V
6	1.48	171	92.47	20.4	-10	-16	8	0	1	91.4	0	3524.51	12.5
7	1.57	171	92.47	20.4	-10	-16	8	0	1	91.4	0	3524.51	12.5
8	1.72	171	92.47	20.4	-10	-16	8	0	1	91.4	0	3524.51	12.5
9	1.79	171	92.47	20.4	-10	-16	8	0	1	91.4	0	3524.51	12.5
10	1.9	171	92.47	20.4	-10	-16	8	0	1	91.4	0	3524.51	12.5
11	2.01	171	92.47	20.4	-10	-16	8	0	1	91.4	0	3524.51	12.5
12	2.12	171	92.47	20.4	-10	-16	8	0	1	91.4	0	3524.51	12.5
13	2.37	171	92.47	20.4	-10	-16	8	0	1	91.4	0	3524.51	12.5
14	2.45	171	92.47	20.4	-10	-16	8	0	1	91.4	0	3524.51	12.5
15	2.56	171	92.47	20.4	-10	-16	8	0	1	91.4	0	3524.51	12.5
16	2.67	171	92.47	20.4	-10	-16	8	0	1	91.4	0	3524.51	12.5
17	2.78	171	92.47	20.4	-10	-16	8	0	1	91.4	0	3524.51	12.5
18	2.89	171	92.47	20.4	-10	-16	8	0	1	91.4	0	3524.51	12.5
19	3.04	171	92.47	20.4	-10	-16	8	0	1	91.4	0	3524.51	12.5
20	3.11	171	92.47	20.4	-10	-16	8	0	1	91.4	0	3524.51	12.5
21	3.22	171	92.47	20.4	-10	-16	8	0	1	91.4	0	3524.51	12.5
22	3.32	171	92.47	20.4	-10	-16	8	0	1	91.4	0	3524.51	12.5

UPDATE ECU PROGRAM

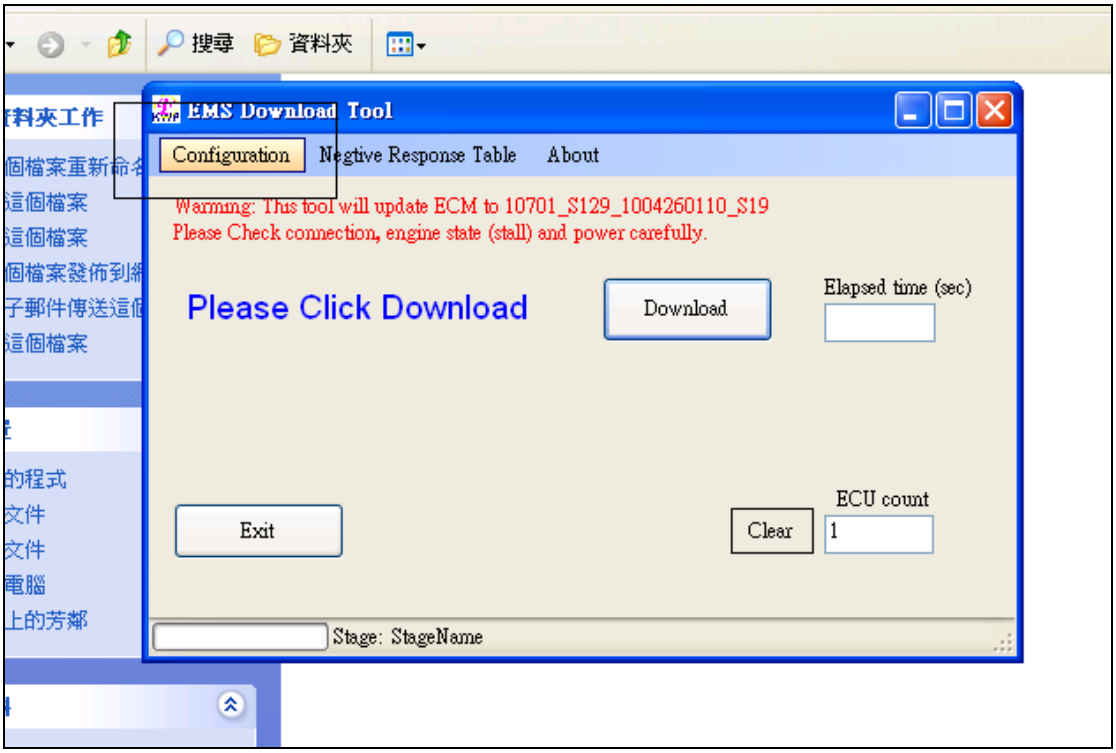
1. Ensure your computer has update program.

2. Connect RS232/USB Conversion cable with computer and diagnostic cable.

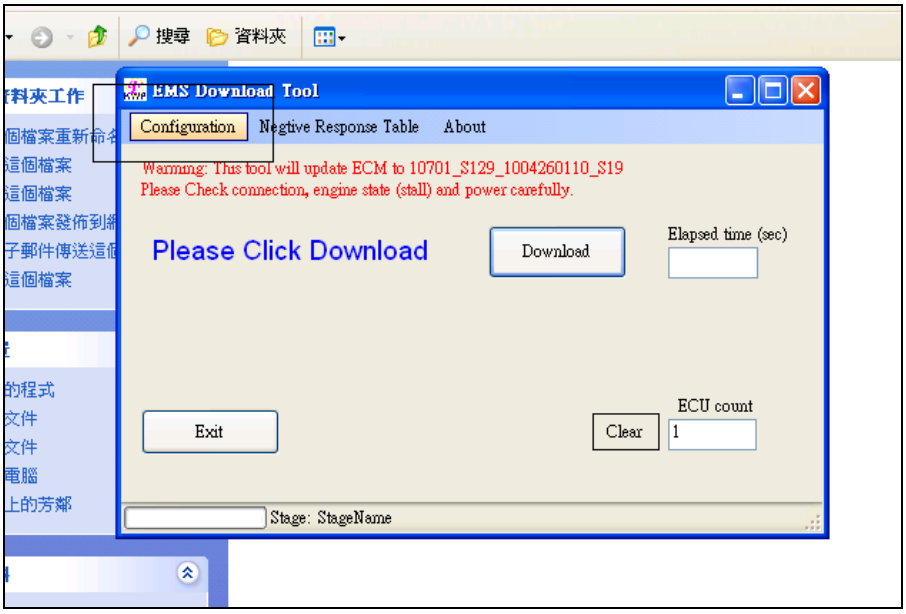
3. Connect diagnostic cable with computer and diagnostic harness on scooter.

4. Turn on key switch and let the speedometer working, but DO NOT crank (ignition) engine turning.

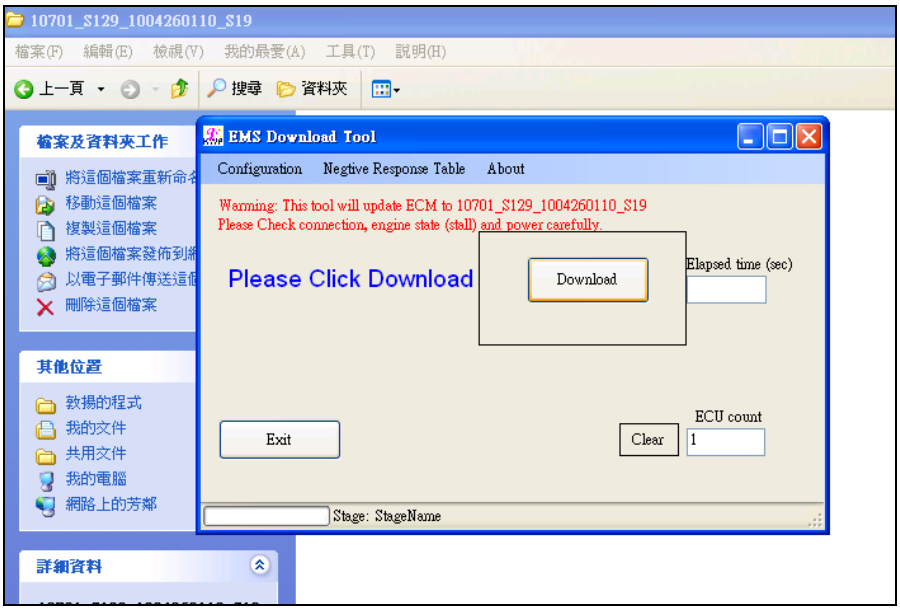
5. Select update program on computer screen. Click twice then screen shoes as follow.



6. Click “configuration” button to select correct COM port.



7. Click “Download” button. The Stage bar will go up until end.



ELECTRONIC FUEL INJECTION

Note: While update program the" Elapsed time" stop at 4~5 sec. Means wrong COM port choose. Please repeat step 6~7.

⚠ CAUTION
Ensure your battery has enough power capacity while update your ECU program.

⚠ CAUTION
Do not crank or ignition scooter while updating ECU program. Or ECU may be destroyed.

BODY FRAME

CHAPTER 6

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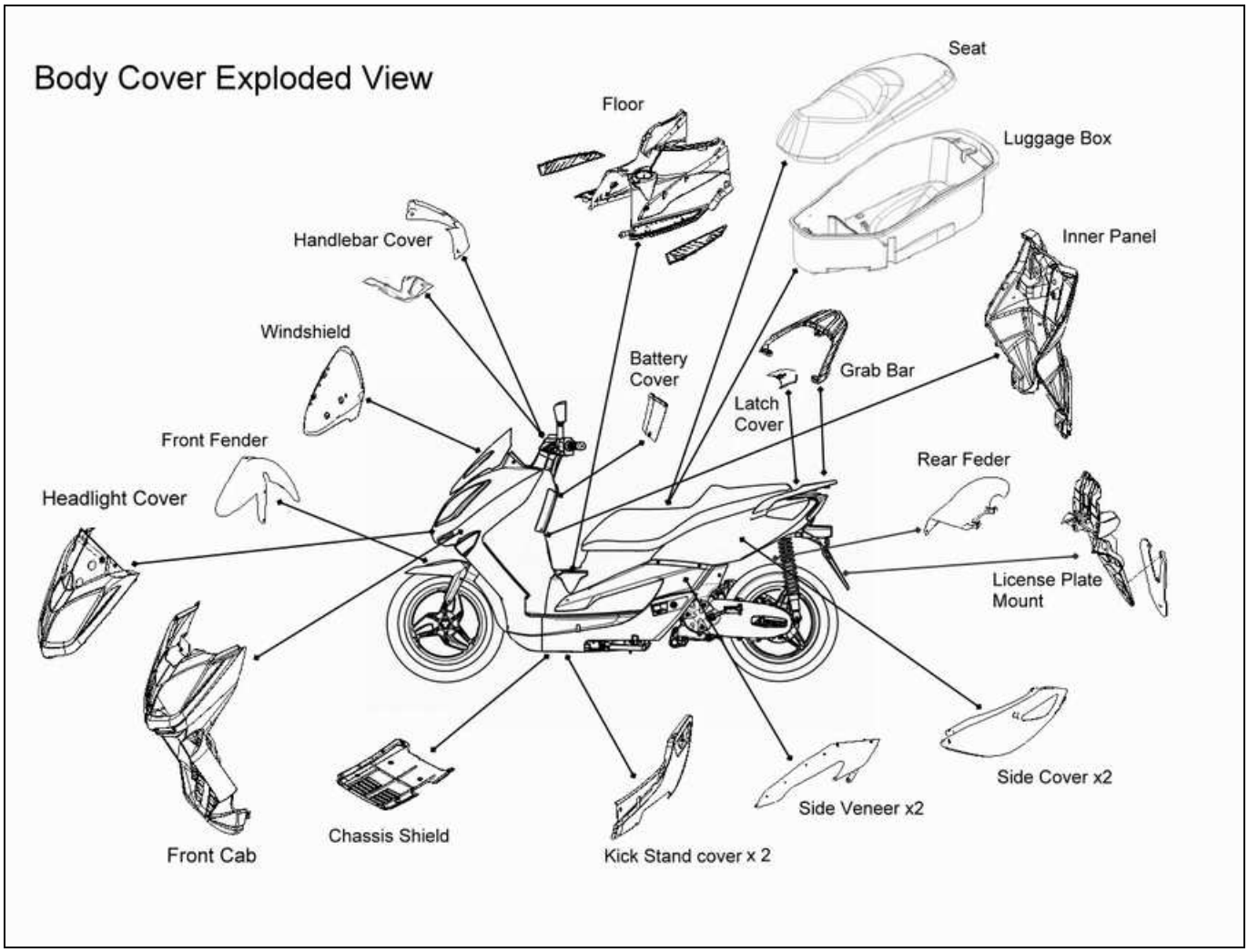


Note:

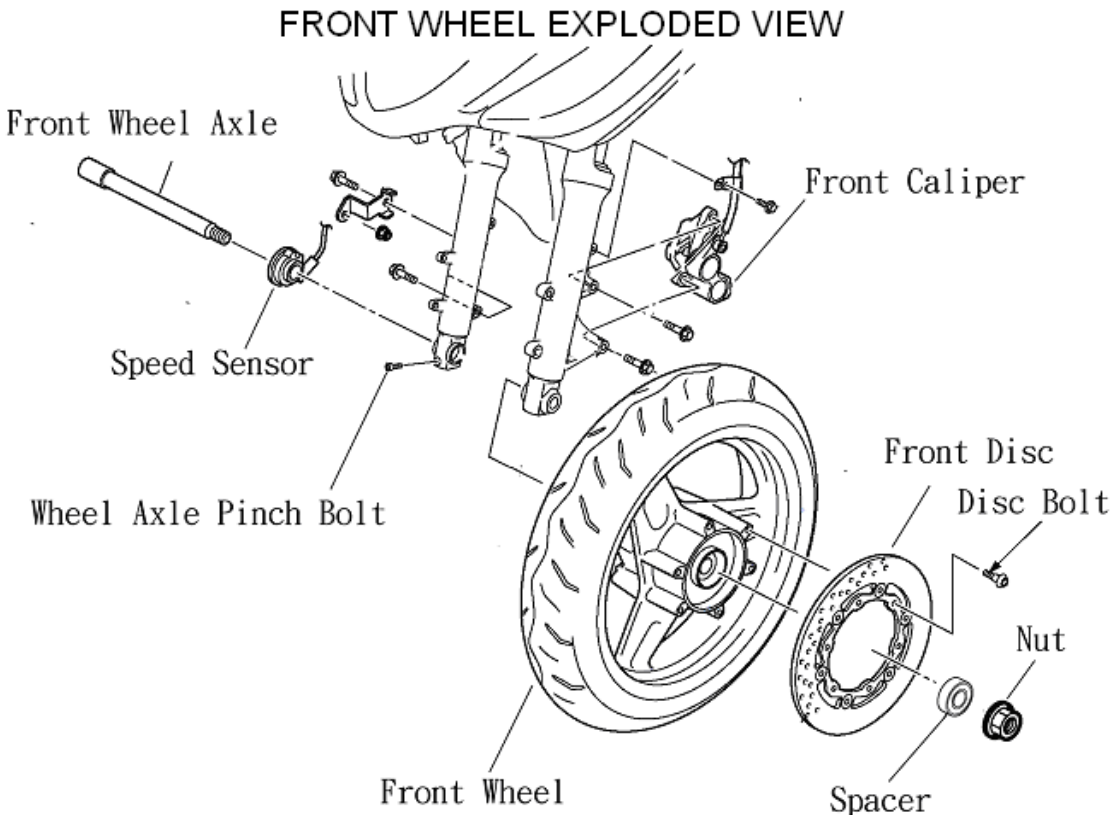
◎ Be careful do not damage plastic covers while assembly or disassembly operation.

◎ Never broken tongue or tab while assembly or disassembly operation.

◎ Align all tongues and grooves of plastic cover first then fasten screw or nut.

◎ Never compacting or hammer force on the all plastic covers during assembly.

1. Handlebar upper/bottom covers.
2. Windshield.
3. Front fender.
4. Headlight cover.
5. Speedometer cover.
6. Chassis shield.
7. Front cab.
8. Battery cover.
9. Both kickstand covers.
10. Seat and luggage box.
11. Grab bar
12. Latch Cover
13. License plate mount
14. Rear Fender
15. Both side covers.
16. Both side veneers.
17. Floors.
18. Inner panel.



1. Elevate front end of the scooter off the ground to remove front wheel and brake from front fork.

⚠ CAUTION

Severe injury could occur if machine tips or falls.

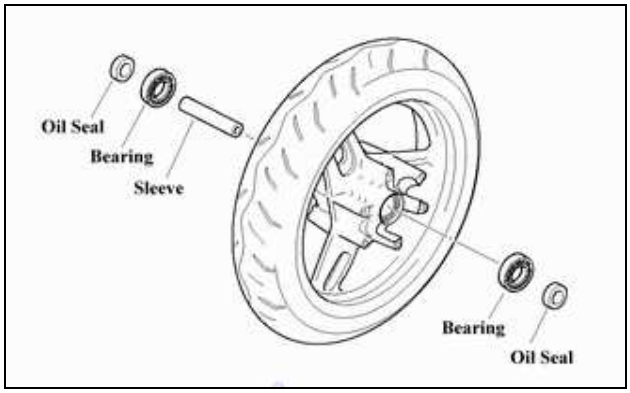
2. Remove front brake calipers. Do not apply the brake lever when removing the brake calipers.

3. Remove front wheel axle, nut, speed sensor and spacer from front fork.

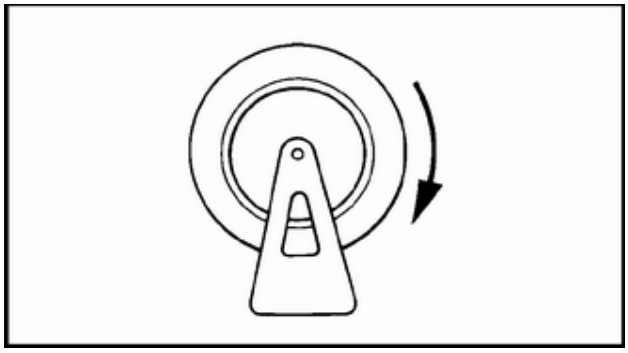
4. Remove front wheel with disc assembly from front fork.

FRONT WHEEL DISASSEMBLY

1. Clean the surface of the front wheel hub.

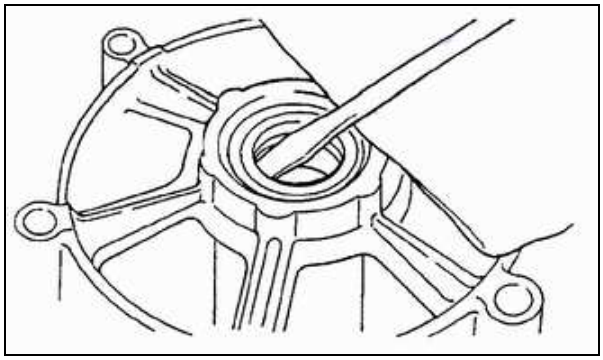


2. Inspect the axle hub main bearings for worn or damaged. The bearing must be inspected visually and by turning feel. The bearing should turn smoothly and quietly.

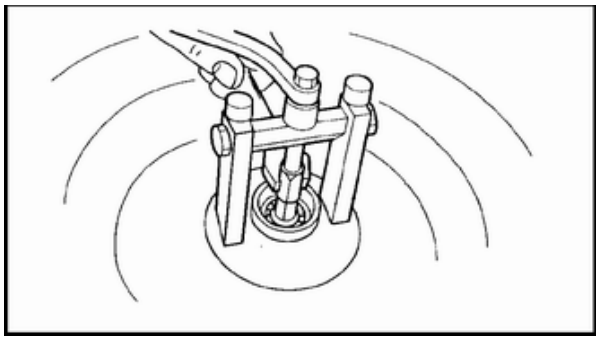


3. Remove the oil seal by a slot screwdriver.

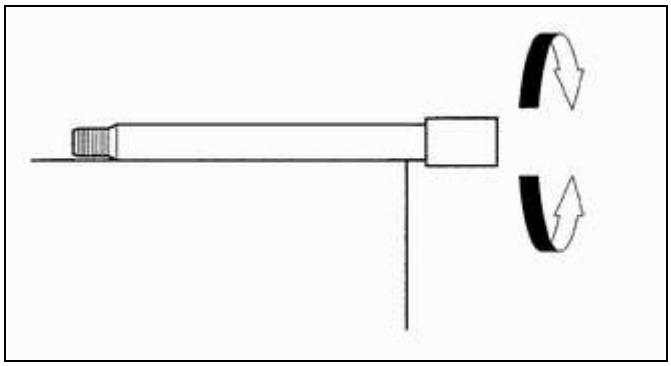
4. To prevent damaging the wheel, place a rag between the screwdriver and the wheel surface.



4. Remove the wheel bearings with a general bearing puller.



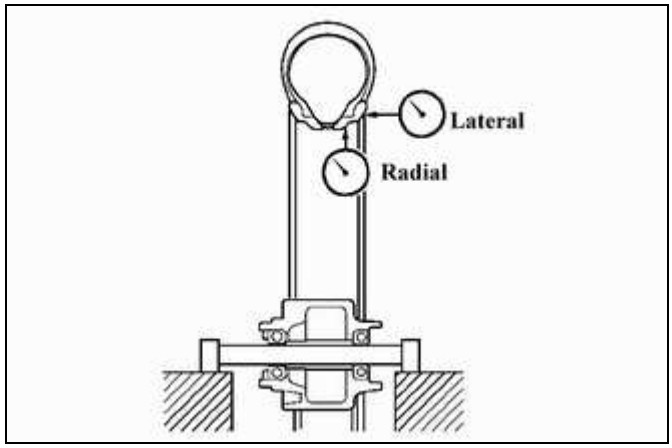
1. Inspect the wheel axle. Roll the wheel axle on a flat surface. Replace if worn or rough movement. Discard hardware.



⚠ WARNING

Do not attempt to straighten a bent wheel axle.

2. Inspect front tire and wheel radial or lateral run-out by dial gauge. Replace if out of specification.



Front Wheel Lateral Limit:

2.00mm

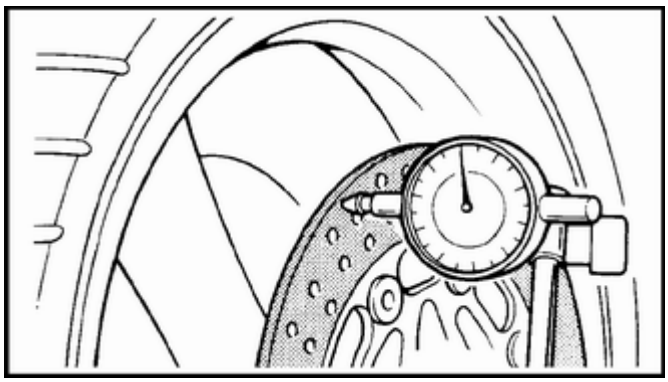
Front Wheel Radial Limit:

3.00mm

1. Place the wheel with disc on a suitable stage. Or install back front fork and elevated front end.

2. Hold the dial gauge at a right angle against the brake disc surface.

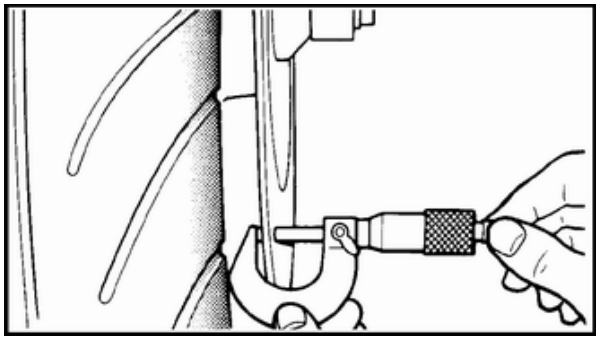
3. Mount a dial indicator and measure disc run-out. Slowly rotate the disc and read total run-out on the dial indicator. Replace the disc if run-out exceeds specifications.



Front Brake disc deflection limit

0.30 mm

4. Visually inspect disc for scoring, scratches, or gouges. Replace the disc if any deep scratches are evident.



5. Use a 0-1" micrometer and measure the disc thickness at eight different points around the pad contact surface. Replace disc if worn beyond service limit.

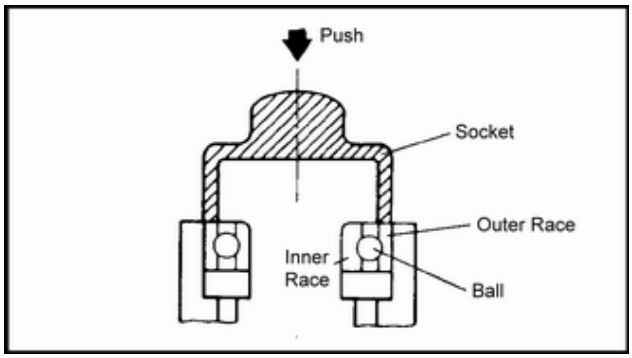
Front Brake Disc Thickness
New: 4.40 mm
Service Limit: 4.00 mm

FRONT WHEEL HUB ASSEMBLY

1. Install the new wheel bearings and oil seal in the reverse order of disassembly.

Note:

Do not apply pressure to the wheel bearing inner race or balls. Pressure should only be applied to the outer race.



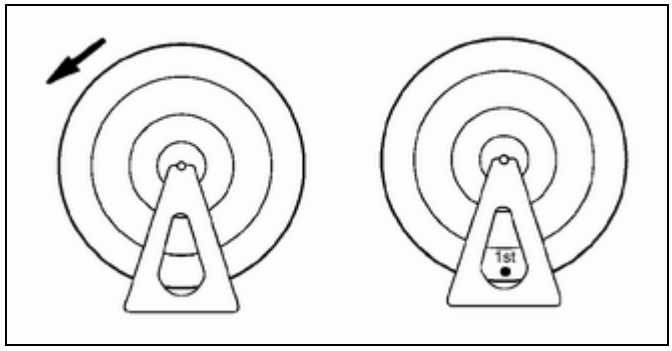
FRONT WHEEL ADJUSTING AND WHEEL STATIC BALANCE

1. After replacing the tire, wheel or both, the front wheel static balance should be adjusted.

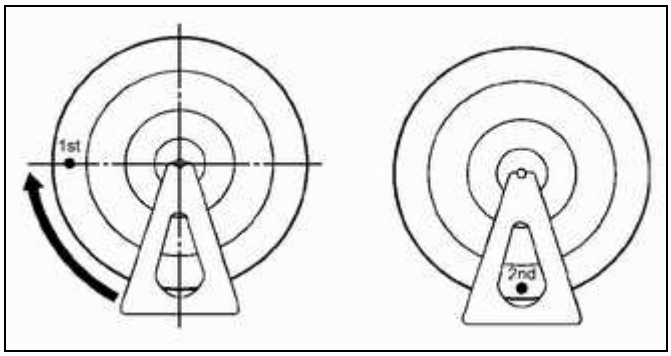
2. Adjust the front wheel static balance with the brake disc installed.

3. Remove balancing weights on front rim.

4. Place the front wheel on a suitable balancing stand. Spin the front wheel. When the front wheel stops, put a mark "1st" at the bottom of the wheel.



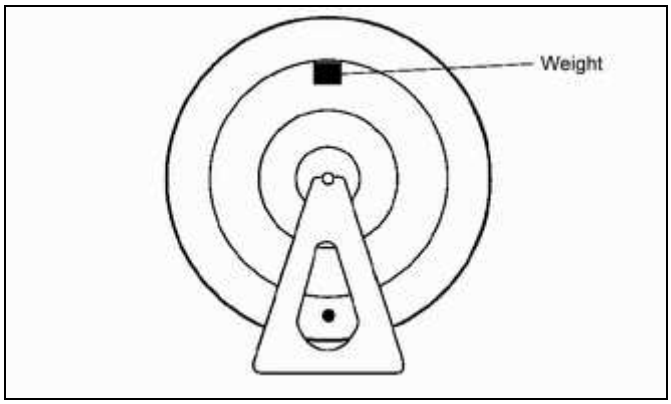
5. Turn the front wheel 90° shown as left.



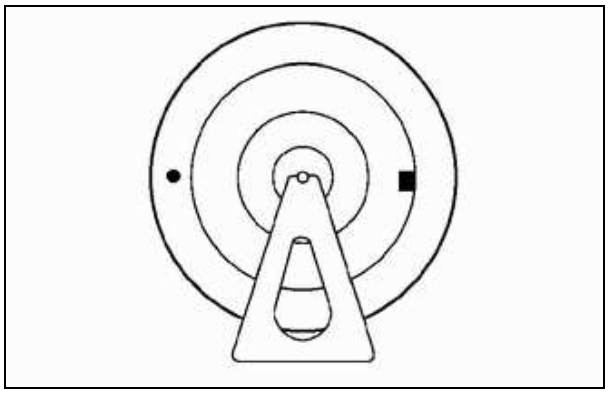
6. Release the front wheel When the wheel stops, put "2nd" mark at the bottom of the wheel.

7. Repeat steps 4 & 5 several times until all the marks come to rest at the same spot where is the front wheel's "heavy spot".

8. Install a balancing weight onto the rim exactly opposite the heavy spot.



9. Turn the front wheel 90° that the heavy spot is positioned as shown.



10. Release the front wheel if the heavy spot does not stay in that position, install a heavier weight.

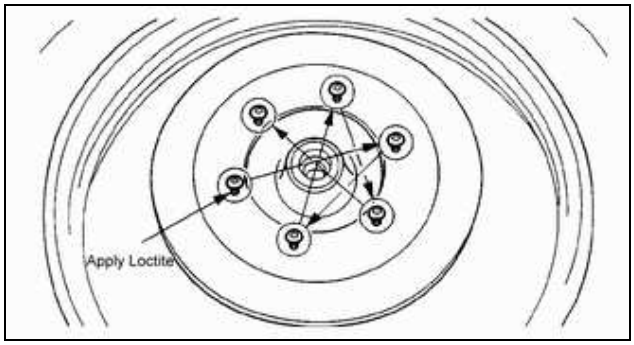
11. Repeat steps 9 and 10 until the front wheel is balanced.

12. Turn the front wheel and make sure it stays at each position without any one heavy point.

FRONT WHEEL INSTALLATION

1. Clean the wheel hub mating surface and install new disc on wheel hub.

2. Install new bolts and tighten disc bolts by crisscross pattern then torque to **30 Nm.**



CAUTION

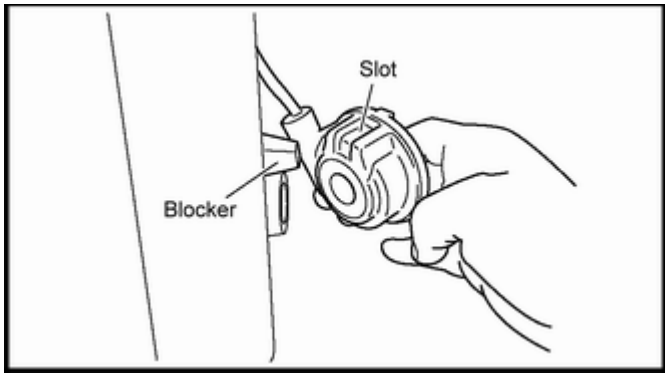
Always use new brake disc mounting bolts. The bolts have a pre-applied locking agent, which is destroyed upon removal.

3. Lubricate oil seal lips, speed sensor, spacer and wheel axle by Lithium-base grease.

4. Install wheel onto front fork.

Note:

Ensure the slot in the speed sensor fits over the blocker on the outer tube.



5. Before fully tightening the wheel axle, push down hard on the handlebar several times and check if the front fork rebounds smoothly.

6. Tighten front wheel axle and front wheel axle pinch bolt

= T

Front Wheel Nut Torque:

55 Nm (40 ft. lbs)

= T

Pinch Bolt Torque:

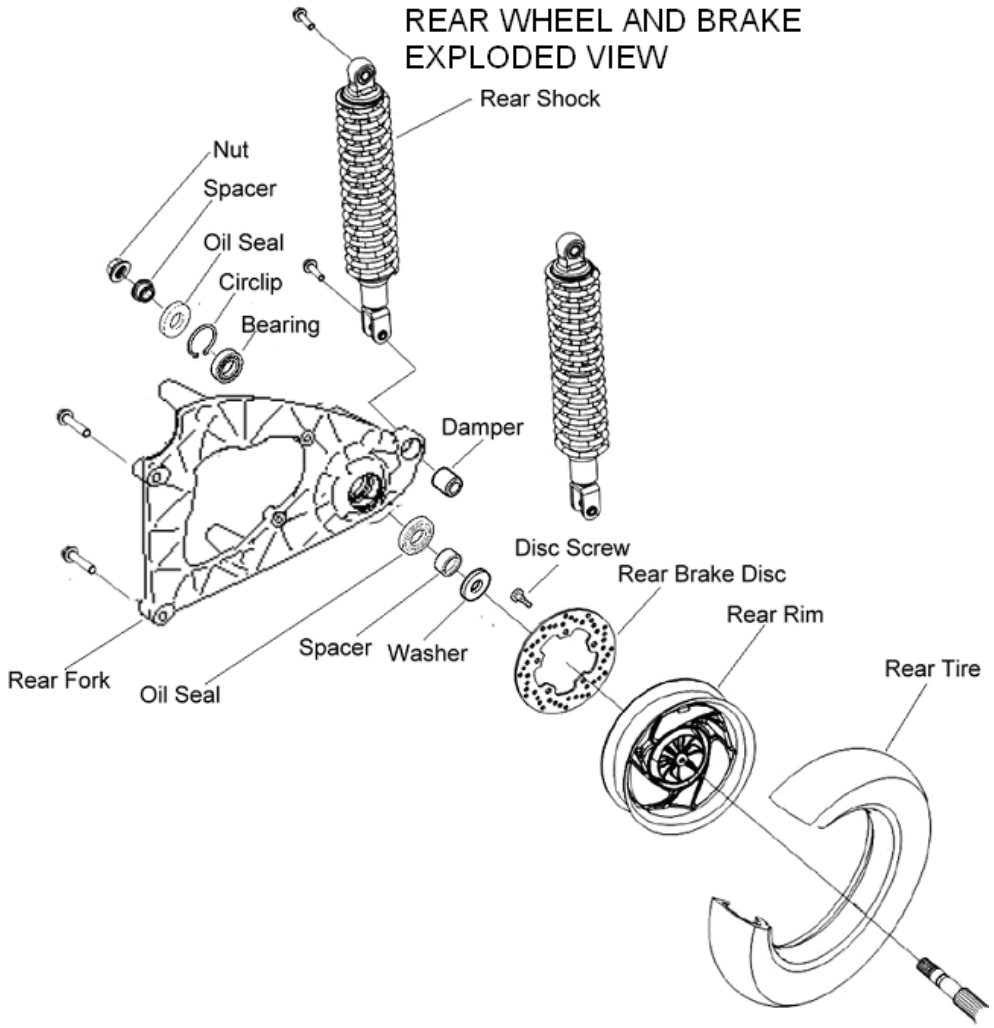
20 Nm (14.5 ft. lbs.)

7. Install front brake calipers ensure the brake cable is routed properly.

= T

Front caliper Bolt Torque:

30 Nm (21.7 ft. lbs.)



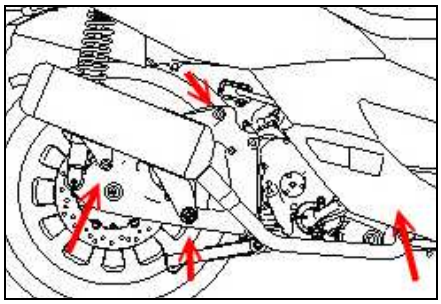
REMOVE THE REAR WHEEL

1. Place the vehicle on a level surface and Stand the center stand that the rear wheel is elevated.

⚠ CAUTION

Severe injury could occur if machine tips or falls.

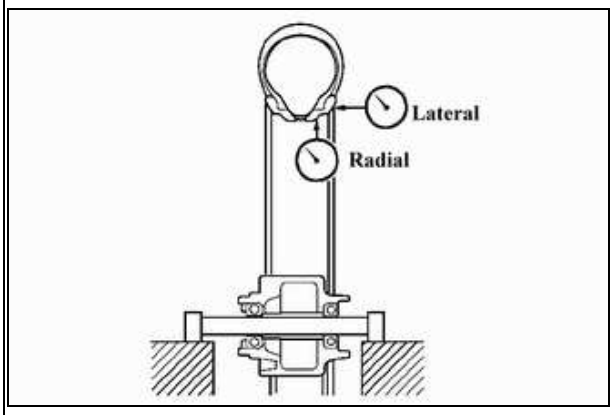
2. Remove exhaust muffler from rear fork and cylinder heat.



3. Loosen rear caliper jammed bolts then remove rear caliper.

4. Remove rear fork jammed bolts and rear axle nut then

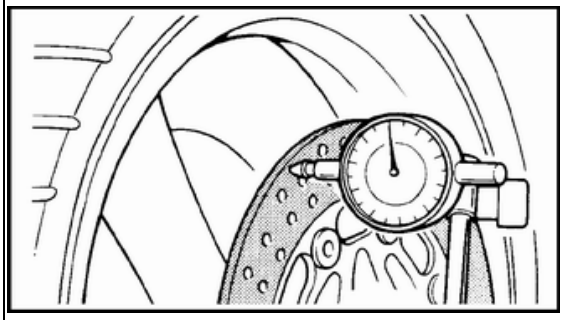
1. Refer page 6.4 to measure rear wheel radial wheel run-out and lateral wheel run-out



Rear Wheel Lateral Limit:
2.00mm
Rear Wheel Radial Limit:
3.00mm

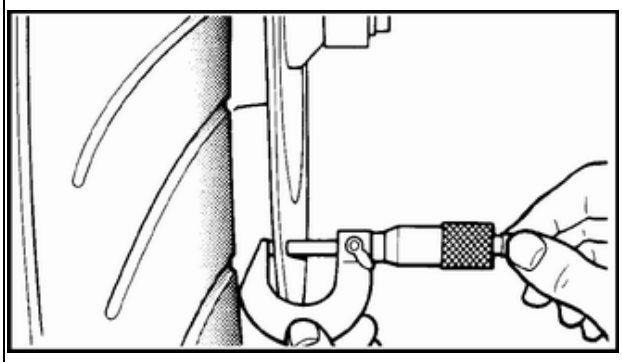
2. Inspect rear wheel drive hub. Replace it if crack or damaged.

3. Visually inspect disc for scoring, scratches, or gouges. Replace the disc if any deep scratches are evident.



Rear Brake disc deflection limit
0.30 mm

4. Use a 0-1" micrometer and measure the disc thickness at eight different points around the pad contact surface. Replace disc if worn beyond service limit.



Rear Brake Disc Thickness
New: 5.00 mm
Service Limit: 4.40 mm

Note:

• After replacing the tire, wheel or both, the rear wheel static balance should be adjusted.

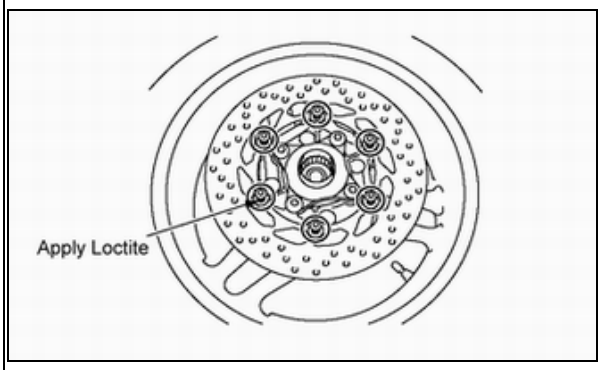
• Adjust the rear wheel static balance with the brake disc and rear wheel drive hub installed.

Refer to **"FRONT WHEEL ADJUSTING AND WHEEL STATIC BALANCE"** on page 6.5 to adjust rear wheel static balance.

REAR WHEEL INSTALLATION

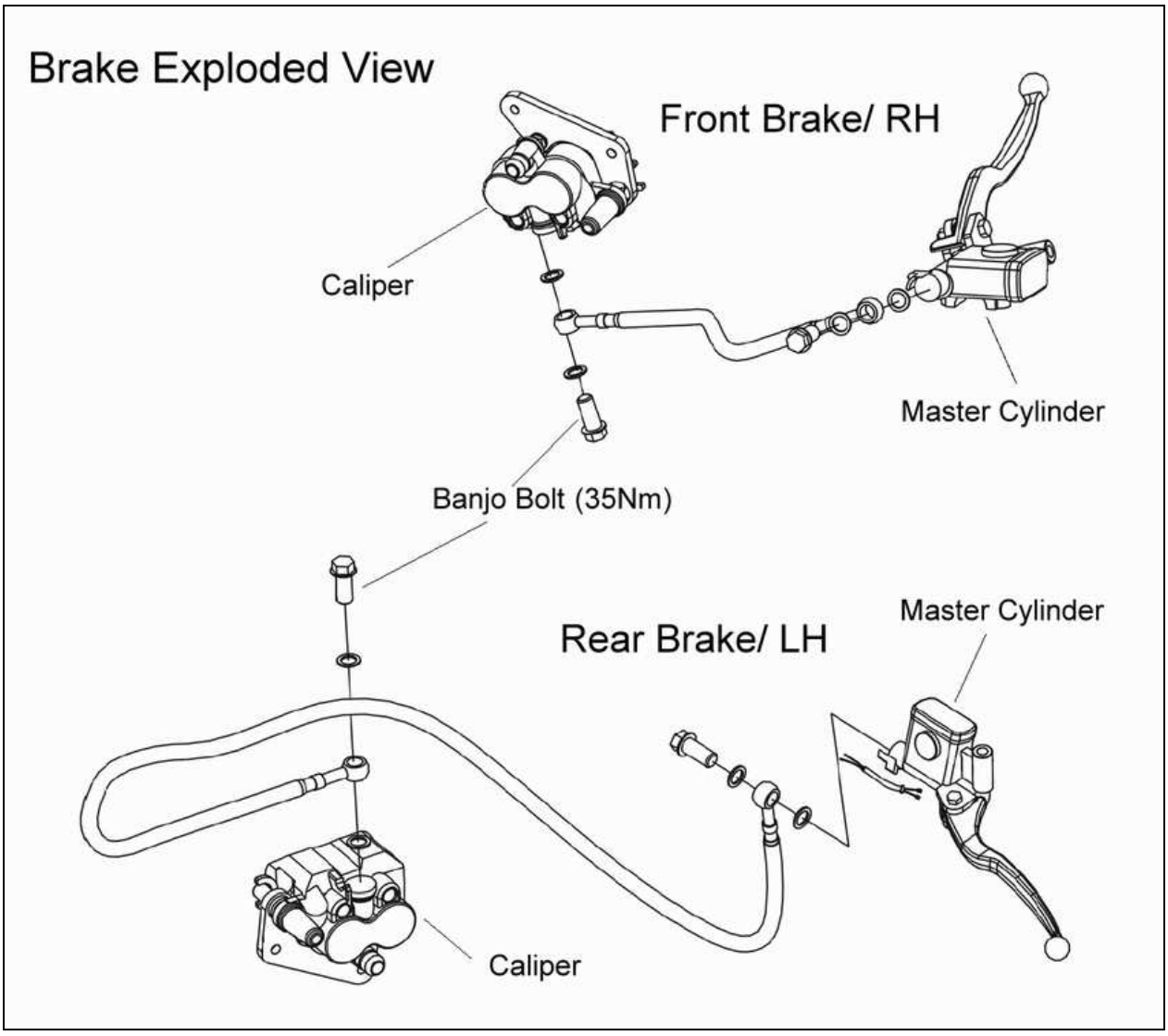
1. Clean the wheel hub mating surface and install new disc on wheel hub.

2. Install new bolts and tighten disc bolts by crisscross pattern then torque to **30 Nm.**



⚠ CAUTION

Always use new brake disc mounting bolts. The bolts have a pre-applied locking agent, which is destroyed upon removal.



Disc brake systems are lightweight, low maintenance, and perform well in the conditions this vehicle will routinely encounter. There are a few things to remember when replacing disc brake pads or performing brake system service to ensure proper system function and maximum pad service life.

1. Optional pads are available to suit conditions in your area. Select a pad to fit riding style and environment.
2. Do not over-fill the master cylinder fluid reservoir.
3. Make sure the brake pedal returns freely and completely.
4. Adjust stop pin on front caliper after pad service.
5. Check and adjust master cylinder reservoir fluid level after pad service.
6. Make sure atmospheric vent on reservoir is unobstructed.
7. Test for brake drag after any brake system service and investigate cause if brake drag is evident.
8. Make sure caliper moves freely on guide pins (where applicable).
9. Inspect caliper piston seals for foreign material that could prevent caliper pistons from returning freely.
10. Perform a brake burnishing procedure after installing new pads to maximize service life.
11. DO NOT lubricate or clean the brake components with aerosol or petroleum products. Use only approved brake-cleaning products.

Brake system consists of the following components or assemblies: brake pedal, master cylinder, hydraulic brake lines, brake calipers, brake pads, and brake discs, which are secured to the drive line.

When the hand activated brake lever is applied it applies pressure on the piston within the master cylinder. As the master cylinder piston moves inward it closes a small opening (compensating port) within the cylinder and starts to build pressure within the brake system. As the pressure within the system is increased, the pistons located in the brake calipers move outward and apply pressure to the moveable brake pads. These pads contact the brake discs and move the calipers in their floating bracket, pulling the stationary side pads into the brake discs. The resulting friction reduces brake disc and vehicle speed.

The friction applied to the brake pads will cause the pads to wear. As these pads wear, the piston within the caliper moves further outward and becomes self-adjusting. Fluid from the reservoir fills the additional area created when the caliper piston moves outward.

Brake fluid level is critical to proper system operation. Too little fluid will allow air to enter the system and cause the brakes to feel spongy. Too much fluid could cause brakes to drag due to fluid expansion.

Located within the master cylinder is the compensating port, which is opened and closed by the master cylinder piston assembly. As the temperature within the hydraulic system changes, this port compensates for fluid expansion or contraction. Due to the high temperatures created within the system during heavy braking, it is very important that the master cylinder reservoir have adequate space to allow for fluid expansion. **Never overfill the reservoir! Do not fill the reservoir beyond the MAX LEVEL line!**

When servicing brake systems use **DOT3 or DOT 4 Brake Fluid.**

WARNING: Once a bottle is opened, use what is necessary and discard the rest in accordance with local laws. Do not store or use a partial bottle of brake fluid. The brake fluid is hygroscopic and it means that it rapidly absorbs moisture. This causes the boiling temperature of the brake fluid to drop, which can lead to early break fade and the possibility of serious injury.

Dirt, dust, or imbedded material on pads or disc.

Spray disc and pads with CRC Brakeleen™ or same equivalent non-flammable aerosol brake cleaner. Remove pads and/or disc hub to clean imbedded material from disc or pads.

Pad(s) dragging on disc (noise or premature pad wear) because of improper adjustment.

Adjust pad stop (front calipers)

Master cylinder reservoir overfilled.

Set to proper level

Master cylinder compensating port restricted.

Clean compensating port

Master cylinder piston not returning completely.

Inspect. Repair as necessary

Caliper piston(s) not returning.

Clean piston(s) seal

Operator error (riding the brake).

Educate operator

Loose wheel hub or bearings.

Check wheel and hub for abnormal movement.

Brake disc warped or excessively worn

Replace disc

Brake disc misaligned or loose

Inspect and repair as necessary

Noise is from other source (axle, hub, disc or wheel).

If noise does not change when brake is applied check other sources. Inspect and repair as necessary

Wrong pad for conditions

Change to a softer or harder pad

Brake System Inspection

⚠ WARNING

Disc brake components rarely require disassembly. Therefore, always follow these preventive measures:

• Never disassemble brake components unless absolutely necessary.

• If any connection on the hydraulic brake system is disconnected, the entire brake system must be disassembled, drained, cleaned, properly filled, and bled after reassembly.

• Never use solvents on internal brake components.

• Use only clean or new brake fluid for cleaning brake components.

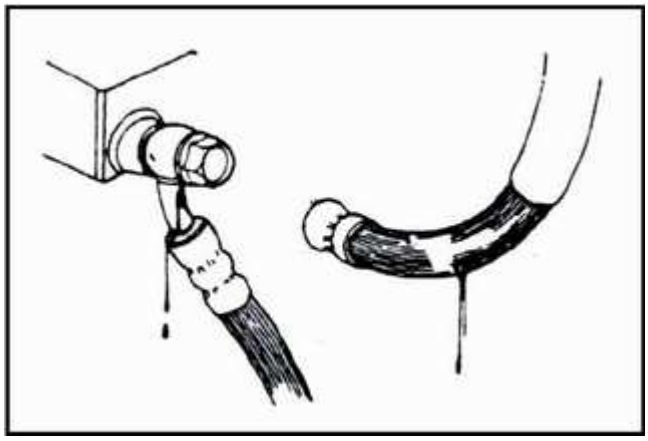
• Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

• Avoid brake fluid coming into contact with the eyes as it can cause serious injury.

• FIRST AID FOR BRAKE FLUID GETTING INTO THE EYES:

• Flush with water for 15 minutes and get immediate medical attention.

1. Visual inspects the junction and line locked fluid leaking

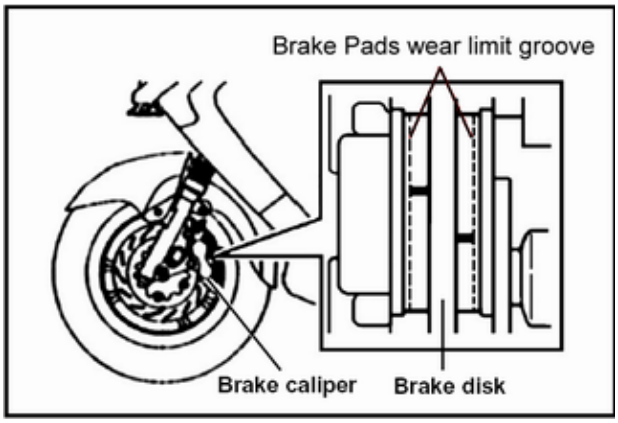


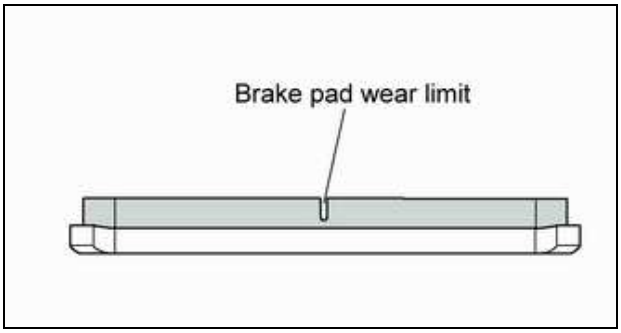
2. Turn handle bar full right and full left to inspect brake hose whether contact movement parts.

3. Press the front fork by handlebar to inspect brake hose whether interferes other parts.

4. Remove front brake calipers. Do not apply the brake lever when removing the brake calipers.

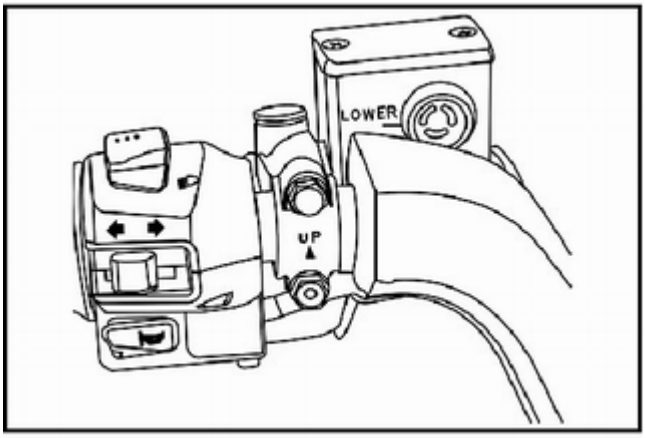
5. Inspect brake pads wear limit





6. Keep fluid level in the master cylinder reservoir to the indicated level inside reservoir.

Use DOT 3 or DOT4 Brake Fluid.



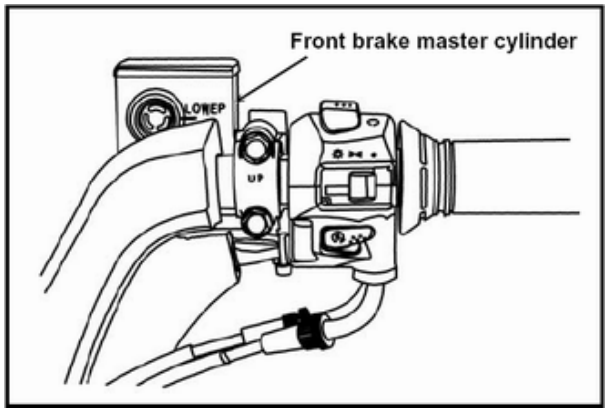
NOTE: When bleeding the brakes or replacing the fluid always start with the furthest caliper from the master cylinder.

⚠ CAUTION

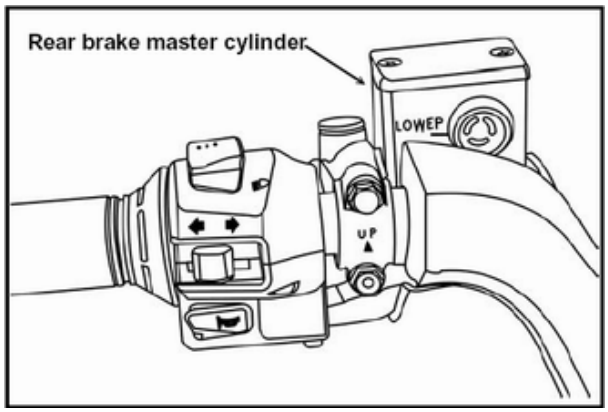
Always wear safety glasses.

⚠ CAUTION

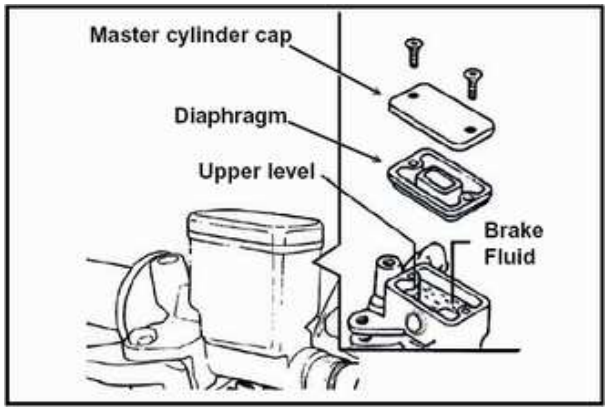
Brake fluid will damage finished surfaces. Do not allow brake fluid to come in contact with finished surfaces. This procedure should be used to change fluid or bleed brakes during regular maintenance.



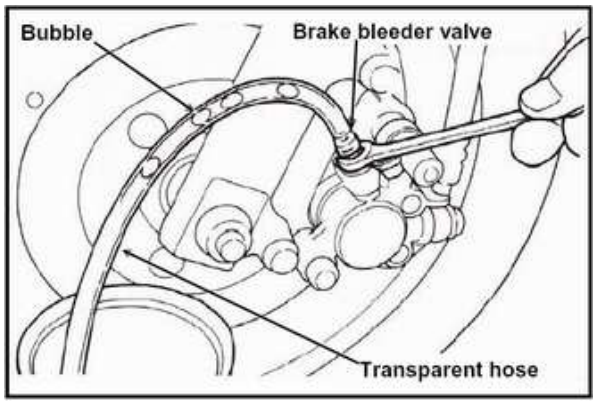
1. Clean master cylinder reservoir cover thoroughly and remove the cover.



2. If changing fluid, remove old fluid from reservoir with a vacuum pump or similar tool.



3. Add brake fluid to the indicated MAX level of reservoir.
4. Begin bleeding procedure with the caliper that is farthest from the master cylinder. Install a box end wrench on caliper bleeder screw. Attach a clean, clear hose to fitting and place the other end in a clean container. Be sure the hose fits tightly on fitting.



5. Have an assistant slowly pump brake lever until pressure builds and holds.
6. Hold brake lever on to maintain fluid pressure, and open bleeder screw. Close bleeder screw and release brake lever.

NOTE: Do not release brake lever before bleeder screw is tight or air may be drawn into master cylinder.

7. Repeat procedure until clean fluid appears in bleeder hose and all air has been purged. Add fluid as necessary to maintain level in reservoir.

⚠ CAUTION

Maintain at least 1.5 cm of brake fluid in the reservoir to prevent air from entering the master cylinder.

8. Tighten bleeder screw securely and remove bleeder hose. Torque bleeder screw to **5 Nm.**
9. Repeat procedure Steps 5 - 8 for the remaining calipers.
10. Add brake fluid to MAX level inside reservoir.

Master Cylinder Fluid Level
Between the MIN and MAX line shown on the reservoir.

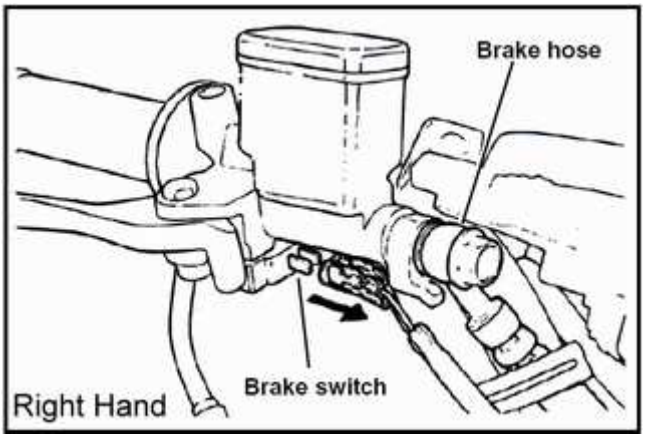
11. Install master cylinder reservoir cover.
12. Field test machine at low speed before putting into service. Check for proper braking action and brake lever reserve.
13. Check brake system for fluid leaks.

MASTER CYLINDER REMOVAL

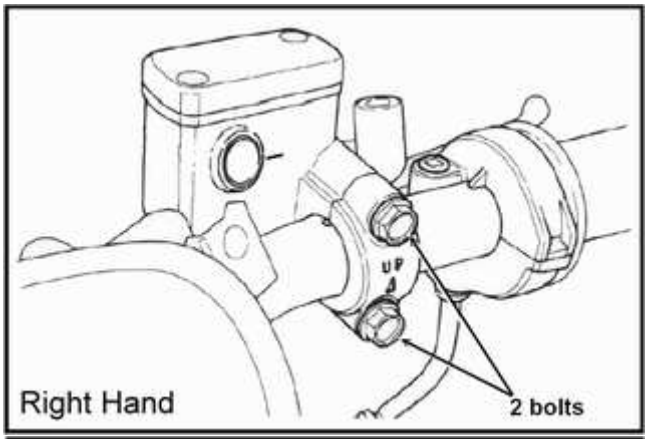
1. Remove the handlebar covers.

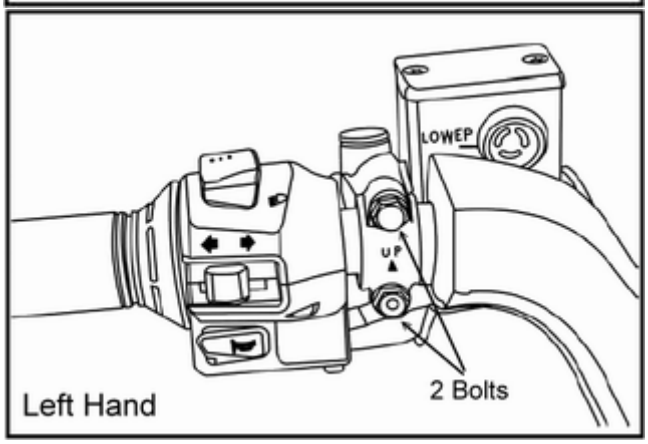
2. Disconnect both wires of brake light switch.

3. Place a container to catch brake fluid under the master cylinder brake line banjo bolts. Drain out the brake fluid.



4. Remove the two mounting fastener bolts that secure the master cylinder to the frame.





⚠ CAUTION

Brake fluid will damage finished surfaces.
Do not allow brake fluid to come in contact with finished surfaces.

NOTE: Make note of front and rear brake line locations to master cylinder.

5. Loosen the brake line banjo bolts and allow fluid to drain.

NOTE: Dispose of fluid properly. Do not re-use.

1. Reverse Steps 1-5 for master cylinder installation.

Refer to the torque specifications in the illustration.

2. Connect brake hoses with 2 new copper washers.

3. After installing the brake lever check lever free play.

Brake Lever free play should be around .090” (2.286 mm).

PAD REMOVAL

1. Elevate and support front of scooter.

⚠ CAUTION

Use care when supporting vehicle so that it does not tip or fall.
Severe injury may occur if machine tips or falls.

2. Loosen pad both support screw 2-3 turns.

3. Push caliper piston into caliper bore slowly.
Remove the upper and lower caliper mounting bolts and remove the caliper from the front wheel.

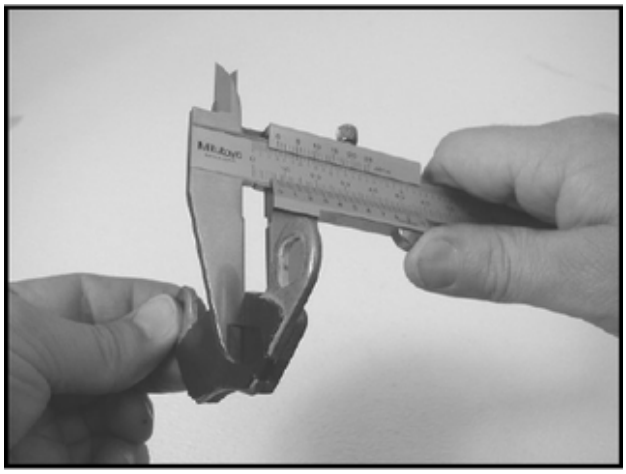
NOTE: When removing caliper, use care not to damage brake line. Support caliper so to avoid kinking or bending brake line.

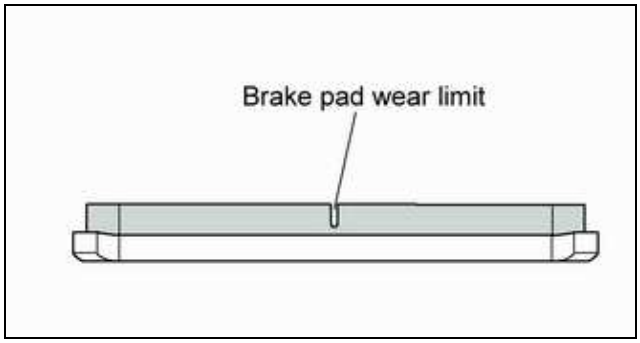
4. Push mounting bracket inward and slip outer brake pad past edge. Then remove inner pad.

NOTE: Brake fluid will be forced through compensating port into master cylinder fluid reservoir when piston is pushed back into caliper. Remove excess fluid from reservoir as required.

PAD INSPECTION

1. Measure the thickness of the pad material. Replace pads if worn beyond the service limit.

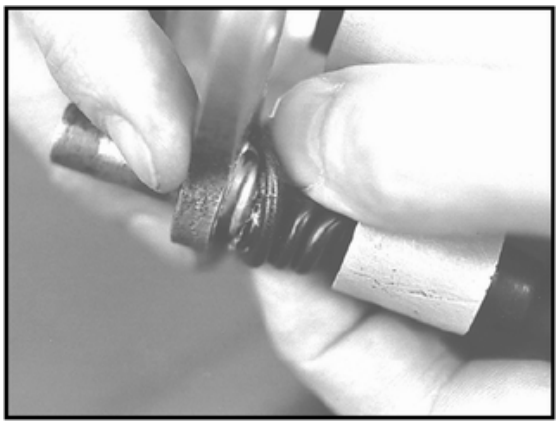




Front Brake Pad Thickness
New: 9 mm
Service Limit: 5 mm

PAD ASSEMBLY / INSTALLATION

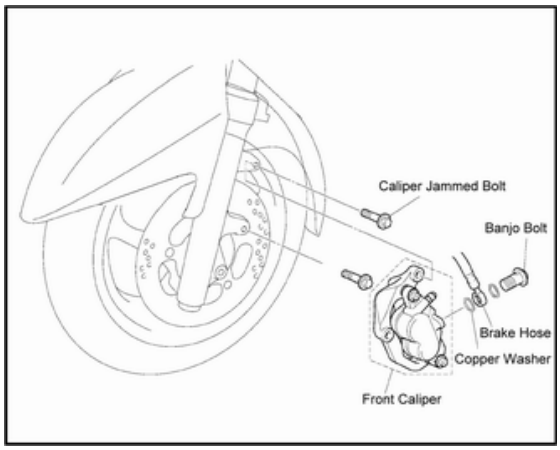
1. Lubricate mounting bracket pins with a light film of grease, and install rubber dust boots.
2. Compress mounting bracket and make sure dust boots are fully seated. Install pads with friction material facing each other.



⚠ WARNING

If brake pads are contaminated with grease, oil, or liquid soaked do not use the pads. Use only new, clean pads.

1. Install caliper and torque mounting bolts to specification.



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Front caliper Bolt Torque:
30 Nm (21.7 ft. lbs.)

2. Install brake line and tighten securely with a line wrench. Torque the banjo bolt brake hose to the proper torque specification.
3. Perform brake-bleeding procedure as outlined earlier in this chapter.
4. Install wheel and torque wheel nuts to specification.

= T

Front Wheel Nut Torque:
55 Nm (40 ft. lbs)

5. Slowly pump the brake pedal until pressure has been built up. Maintain enough of brake fluid in the reservoir to prevent air from entering the brake system.

BRAKE BURNISHING PROCEDURE

It is required that a burnishing procedure be performed after installation of new brake pads to extend service life and reduce noise. Start machine and slowly increase speed to 30 mph. Gradually apply brakes to stop machine. Allow pads and disc to cool sufficiently during the procedure. Do not allow pads or disc to become hot or warping may result. Repeat this procedure 10 times.

PAD REMOVAL

1. Elevate and support rear of vehicle.

⚠ CAUTION

Use care when supporting vehicle so that it does not tip or fall. Severe injury may occur if machine tips or falls.

2. Remove the two caliper mounting bolts and lift caliper off the brake disc.

NOTE: When removing caliper, be careful not to damage brake line. Support caliper so as not to kink or bend brake line.

3. Push caliper piston into the caliper bore slowly and remove caliper from swing arm.

NOTE: Brake fluid will be forced through compensating port into master cylinder fluid reservoir when piston is pushed back into caliper. Remove excess fluid from reservoir as required.

4. Push caliper mounting bracket inward and slip outer brake pad past the edge to remove.
5. Remove the inner brake pad.

PAD INSPECTION

1. Clean the caliper with brake cleaner or alcohol.
2. Measure the thickness of the pad material. Replace pads if worn beyond the service limit.

Rear Brake Pad Thickness
New 10 mm
Service Limit 6.5 mm

1. Lubricate mounting bracket pins with a light film of all season grease, and install rubber dust boots.
2. Compress mounting bracket and make sure dust boots are fully seated. Install pads with friction material facing each other.

⚠ WARNING
If brake pads are contaminated with grease, oil, or liquid soaked do not use the pads. Use only new, clean pads.

3. Install brake line and tighten securely with a line wrench. Torque the banjo bolt brake hose to the proper torque specification.
4. Install caliper and torque mounting bolts to specification.
5. Perform brake-bleeding procedure as outlined earlier in this chapter.

= T
Front caliper Bolt Torque: 30 Nm (21.7 ft. lbs.)

6. Slowly pump the brake lever until pressure has been built up. Maintain enough of brake fluid in the reservoir to prevent air from entering the brake system.
7. Verify fluid level in reservoir is up to the MAX line inside reservoir and install reservoir cap.

BRAKE BURNISHING PROCEDURE

It is required that a burnishing procedure be performed after installation of new brake pads to extend service life and reduce noise. Start machine and slowly increase speed to 30 mph. Gradually apply brakes to stop machine. Allow pads and disc to cool sufficiently during the procedure. Do not allow pads or disc to become hot or warping may result. Repeat this procedure 10 times.

BRAKE SQUEAL / POOR BRAKE PERFORMANCE

- Air in system
- Water in system (brake fluid contaminated)
- Caliper or disc misaligned
- Caliper dirty or damaged
- Brake line damaged or lining ruptured
- Worn disc and/or friction pads
- Incorrectly adjusted stationary pad
- Worn or damaged master cylinder or components
- Damaged break pad noise insulator
- Brake pads dragging
- Brake caliper dragging

PEDAL VIBRATION

- Disc damaged
- Disc worn (run-out or thickness variance exceeds service limit)

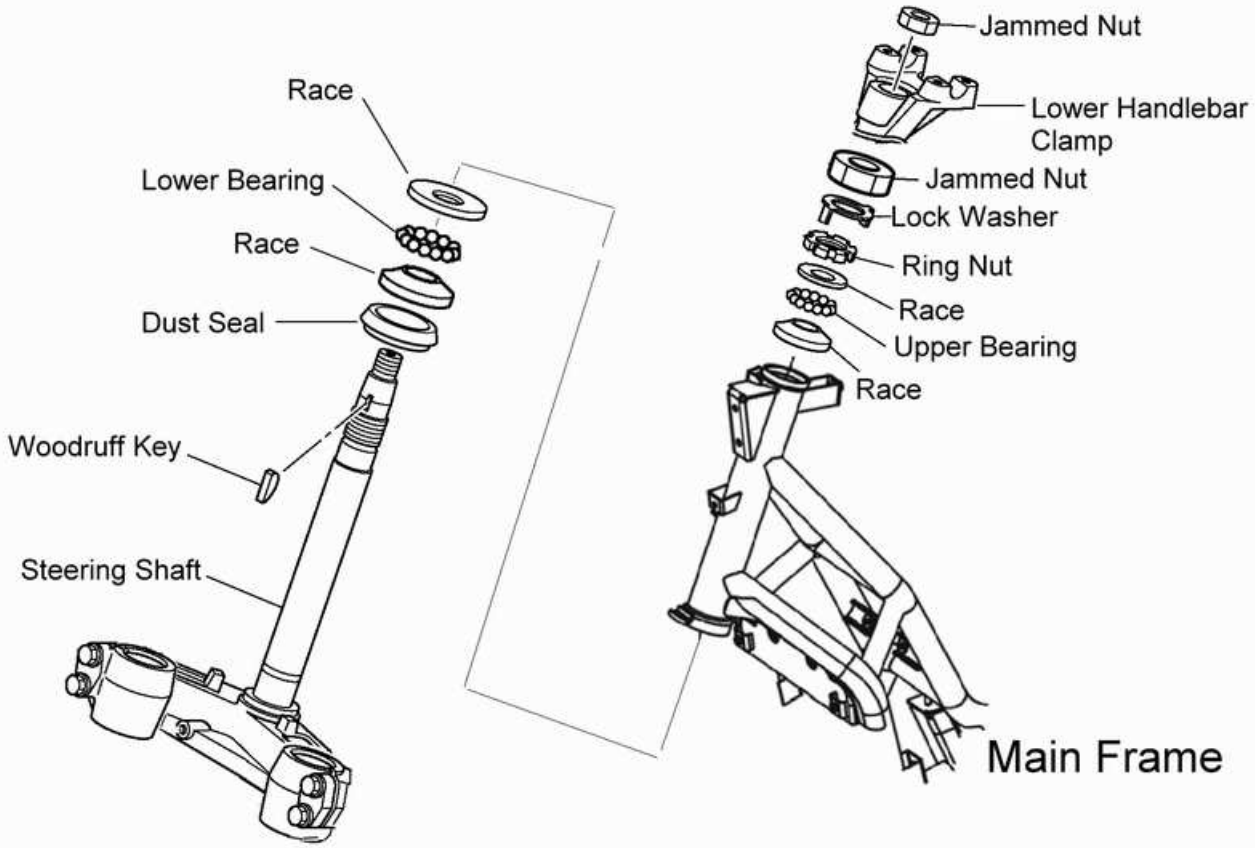
CALIPER OVERHEAT (BRAKES DRAG)

- Compensating port plugged
- Pad clearance set incorrectly
- Brake pedal binding or unable to return fully
- Residue build up under caliper seals
- Operator riding brakes

BRAKE LOCK

- Alignment of caliper to disc
- Caliper pistons sticking
- Improper assembly of brake system components

Steering Shaft Exploded View



1. Support scooter by Main stand.

⚠ CAUTION

Use care when supporting vehicle so that it does not tip or fall. Severe injury may occur if machine tips or falls.

2. Remove handlebar cover,

3. Disconnect the speedometer, brake switch, both switch housing harnesses and throttle cables.

4. Remove handlebar upper clamps, woodruff and handlebar.

5. Remove handlebar lower clamp jammed nut then use a soft face hammer to remove handlebar lower clamp from steering shaft.

6. Remove steering shaft bearing jammed nut.

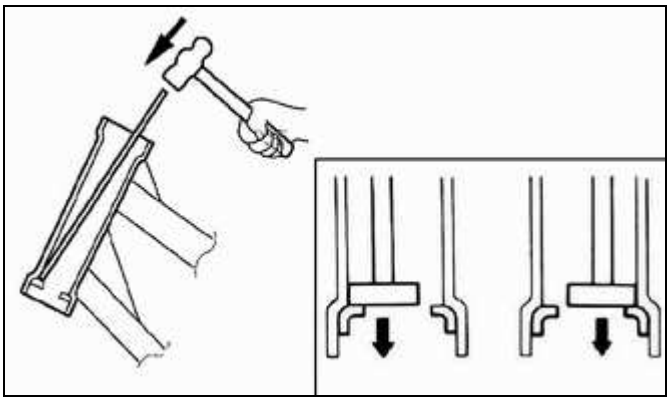
7. Remove lock washer from ring nut groove.

⚠ WARNING

The locking agent on the existing bolts was destroyed during removal. DO NOT reuse old hardware. Serious injury or death could result if fasteners come loose during operation.

8. Remove ring nut, races, bearings and steering shaft from mainframe.

9. Remove both bearing races from steering head pipe with long rod and hammer.



10. Remove the bearing race from the lower bracket with a floor chisel and hammer.

11. Install a new rubber seal and new bearing races.

⚠ CAUTION

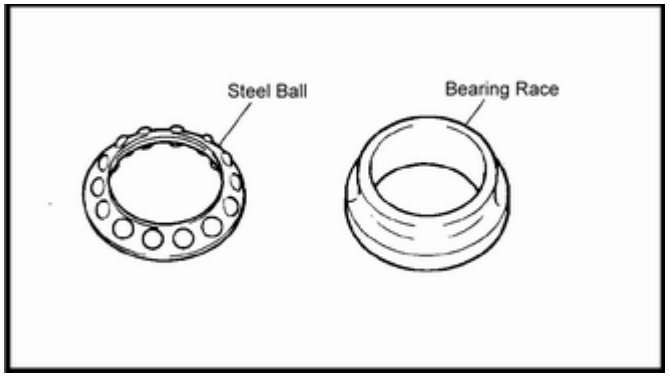
The steering head pipe could be damaged. If the bearing race is not installed properly,

⚠ CAUTION

Always replace the bearings and bearing races as a set.

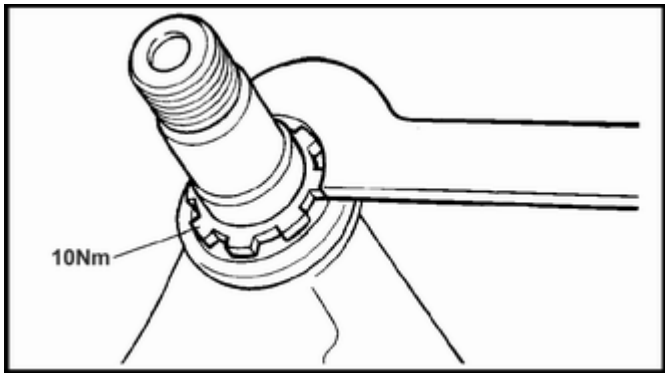
Whenever the steering head is disassembled, replace the rubber seal.

1. Inspect bearing race surface and steel ball pitting or damaged.

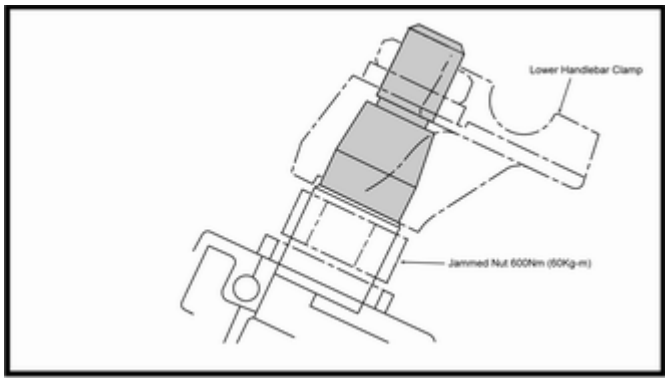


1. Lubricate bearing race, upper bearing and lower bearing with a light film of all season grease, and install them into steering shaft.

2. Install lower steering ring nut and torque it to 10Nm.



3. Install lock washer and jammed nut then torque to 600Nm.



4. Install lower handlebar clamp into steering and Jammed then torque to 1000Nm.

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Ring Nut of Steering Bearing Torque:

10 Nm (7 ft. lbs.)

Jammed Nut of Steering Bearing Torque:

600Nm (430 ft. lbs.)

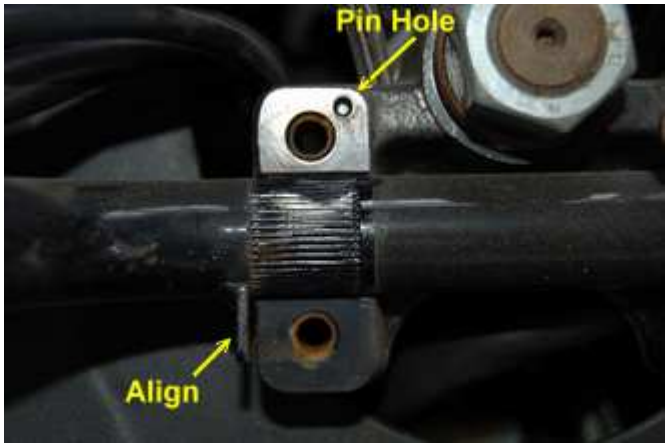
Jammed Nut of Lower Clamp:

1000Nm(720 ft. lbs.)

BODY FRAME

Steering Post Assembly

1. Position the two steering post blocks properly onto the handlebars.



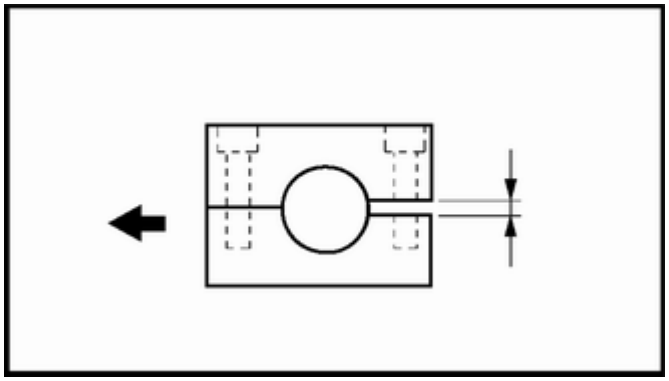
2. Install the front block bolts first and evenly tighten the bolts down. Evenly torque the 2 front bolts to 15--18 Nm (11--13 ft.lbs).

3. Install the rear bolts and tighten evenly. Evenly torque the 2 rear bolts to 15--18 Nm (11--13 ft.lbs.).

4. Install the four handlebar bolts and pod bracket loosely into the blocks.

5. Install the handlebar pod and screws.

NOTE: **There will be a slight gap on the backside of the blocks after the procedure is performed**.

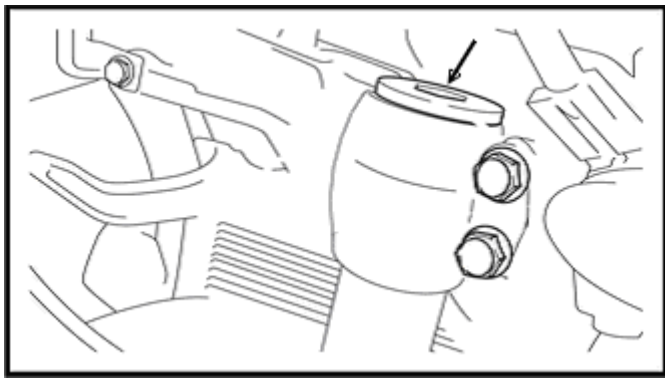


1. Elevate the vehicle off the ground to relieve the suspension load.

⚠ CAUTION

Use care when supporting vehicle so that it does not tip or fall.
Severe injury may occur if machine tips or falls.

2. Remove the front shock top cap from shock.



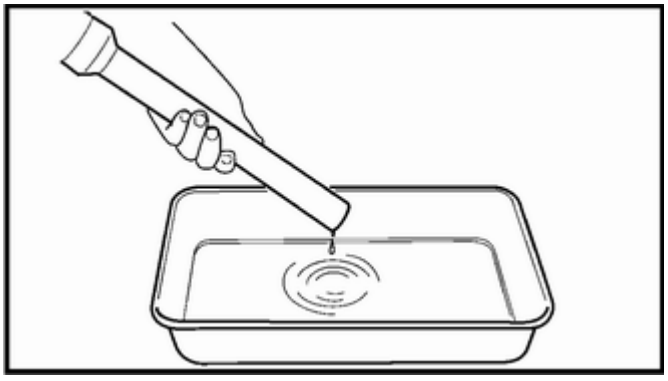
⚠ CAUTION

Springs are under tension. Wear safety glasses and use caution when removing springs.
Severe injury can result.

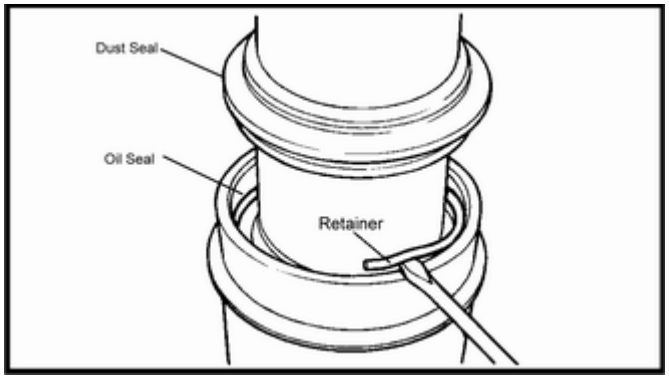
3. Remove the spring from front shock.

4. Stroke the outer tube several times while draining the fork oil.

5. Use a bowl to get draining oil.



6. Remove dust seal and oil seal retainer.



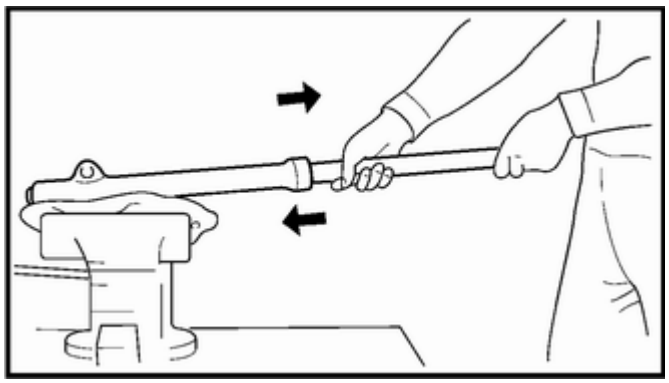
⚠ CAUTION

Do not scratch the inner tube surface.

7. Hold the front fork leg horizontally.

8. Securely clamp the brake caliper bracket in a vise with soft jaws.

9. Separate the inner tube from the outer tube by pulling the inner tube forcefully but carefully.



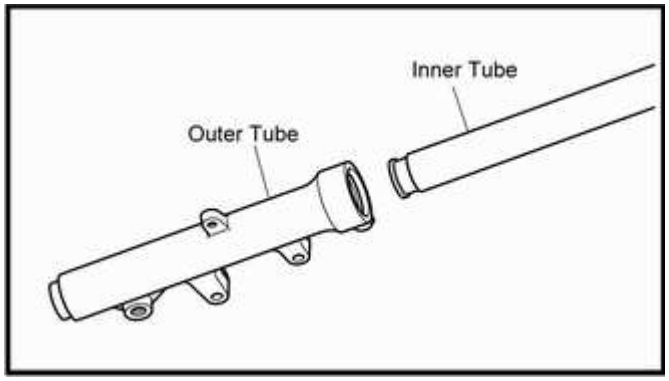
⚠ CAUTION

• Excessive force will damage the oil seal and bushing. A damaged oil seal or bushing must be replaced.

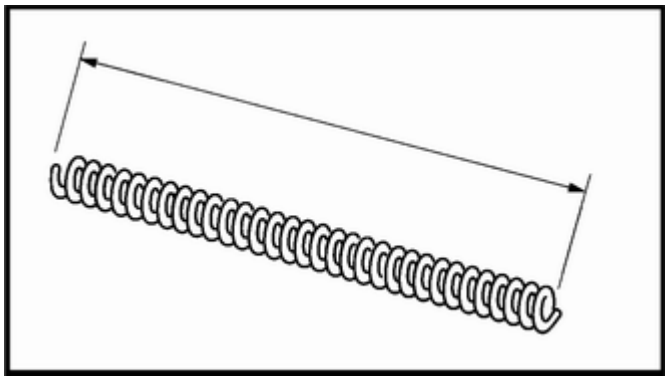
• Avoid bottoming the inner tube into the outer tube during the above procedure, as the oil flow stopper will be damaged.

Front Fork Inspection

1. Inspect inner tube chrome surface. Replace it if has been scratched.
2. Verify inner and outer tube body. Replace them if has bent and damaged.



3. Inspect spring free length. Replace it if out of specification.



Front Fork Spring Free Length

270mm

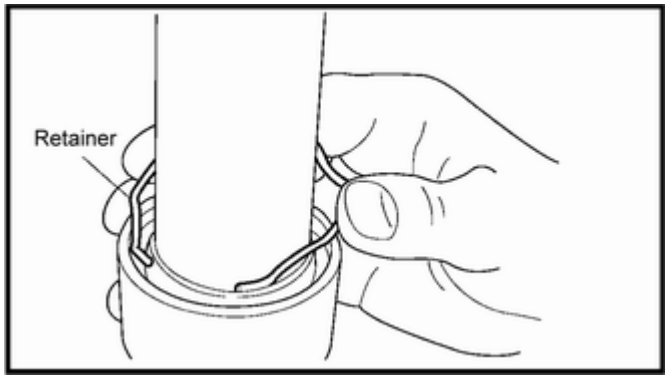
Front Fork Spring Service Limit

250mm

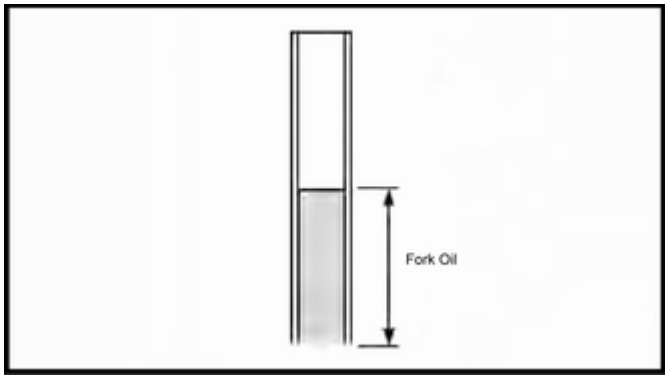
Note: Before assembling the front fork leg, ensure all of the components are clean.

1. Apply grease onto oil seal lips.
2. Lubricate the surface of the inner tube with fork oil.
3. Install oil seal onto inner tube.

4. Place inner tube slowly into outer tube.
5. Install oil seal retainer.
6. Slowly adjust oil seal retainer until fit into outer tube groove,



7. Install dust seal onto inner tube.
8. Fill recommended fork oil into inner tube.



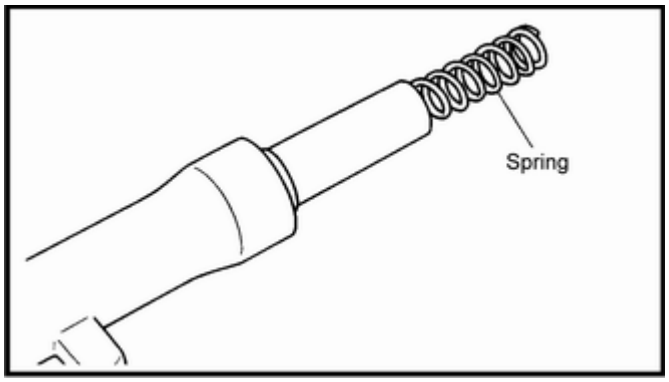
WARNING

Make sure the oil levels in both front forks are equal. Uneven oil levels can result in poor handling and a loss of stability.

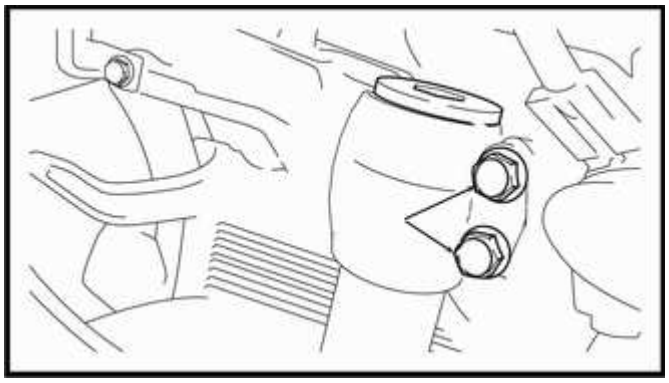
Front Fork Oil Capacity
130cc ± 5cc

9. Install dust seal onto inner tube.

10. Install Spring into inner tube.



11. Install both forks into triple tree clamp hole.



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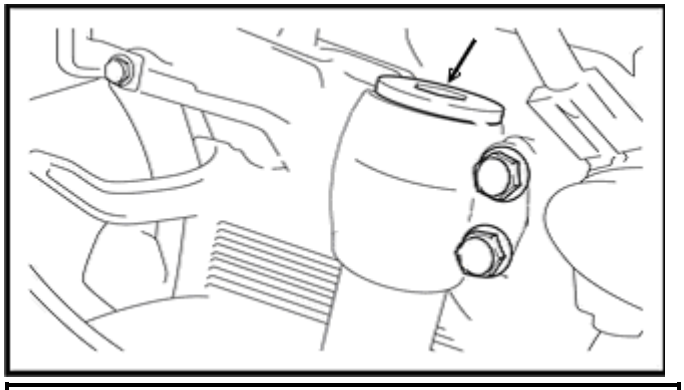
Triple Tree Clamp Torque:
30 Nm (21.7 ft. lbs.)

12. Torque the cap bolt to specification.



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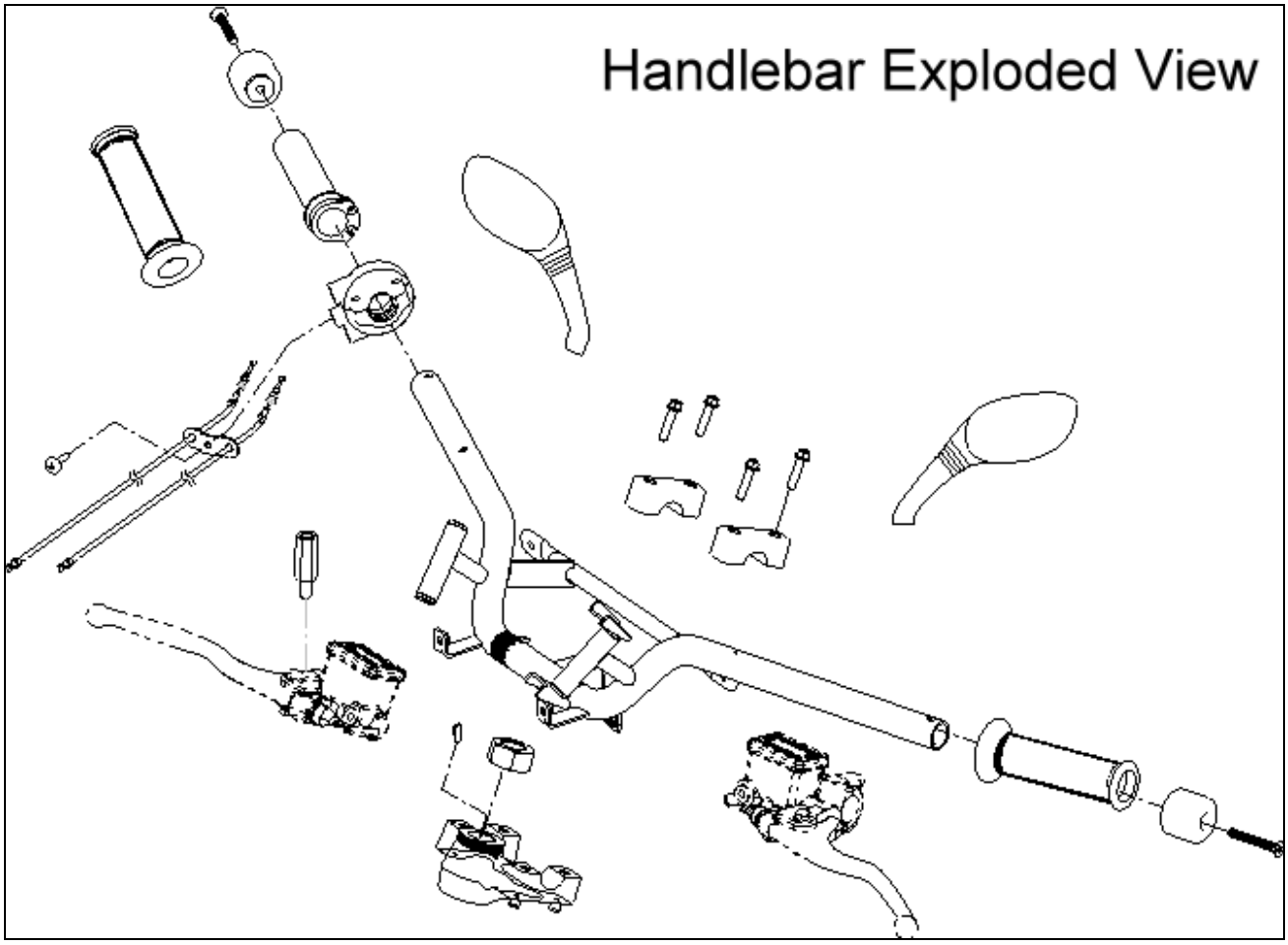
Front Fork Cap Torque:
70 Nm (50 ft. lbs.)

HANDLEBAR

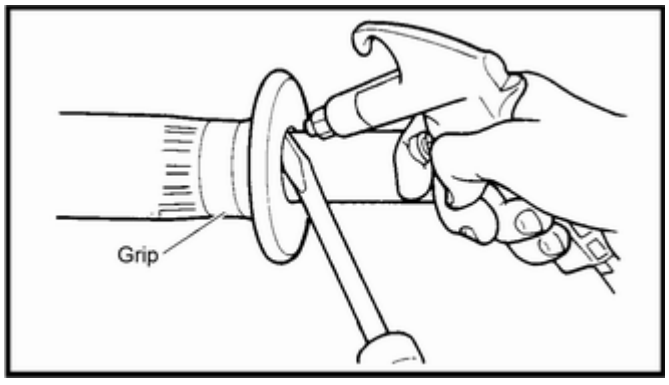


1. Stand the scooter on a level surface.

> **⚠ CAUTION**
>
> Use care when supporting vehicle so that it does not tip or fall.
>
> Severe injury may occur if machine tips or falls.

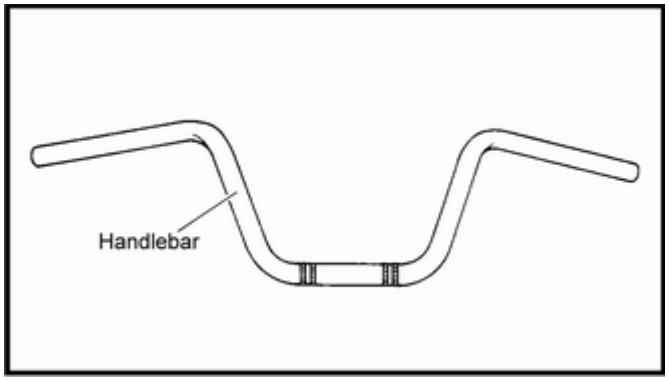
2. Remove both weights, which locate on end of handlebar.

3. Remove both grips by low-pressure air.



4. Blow compressed air between the handlebar and the handlebar grip, and gradually push the grip off the handlebar.

5. Remove handlebar from steering shaft.

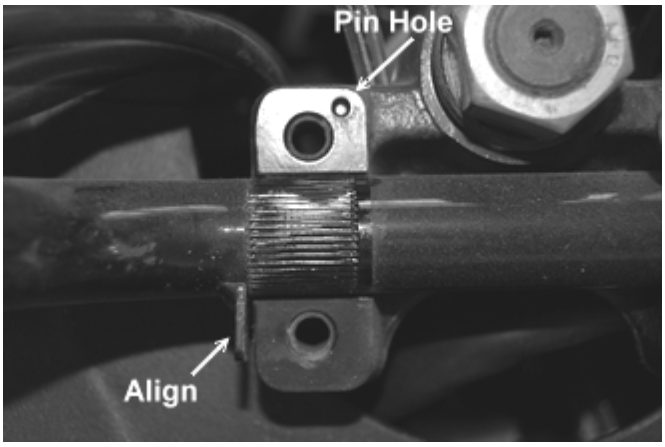


1. Inspect handlebar, replace it if has bent, cracked or damaged.

WARNING

Do not attempt to straighten a bent handlebar as this may dangerously weaken it.

1. Position the two steering post blocks properly onto the handlebars.

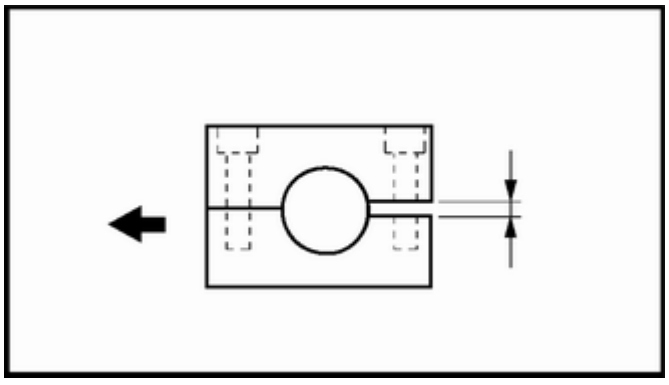


2. Install the front block bolts first and evenly tighten the bolts down. Evenly torque the 2 front bolts to 15--18 Nm (11--13 ft.lbs).
3. Install the rear bolts and tighten evenly. Evenly torque the 2 rear bolts to 15--18 Nm (11--13 ft.lbs.).

4. Install the four handlebar bolts and pod bracket loosely into the blocks.

5. Install the handlebar pod and screws.

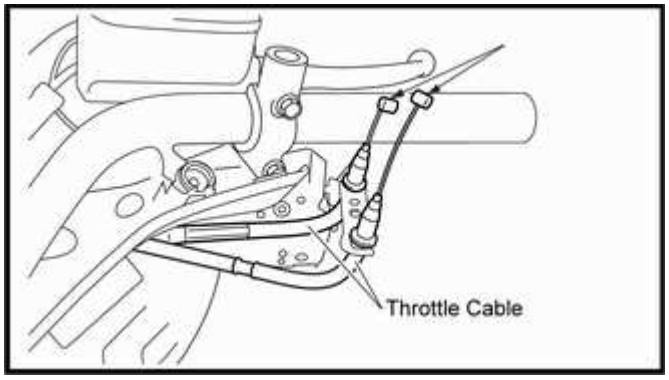
NOTE: **There will be a slight gap on the backside of the blocks after the procedure is performed**.



6. Install both switch housings and master cylinders.

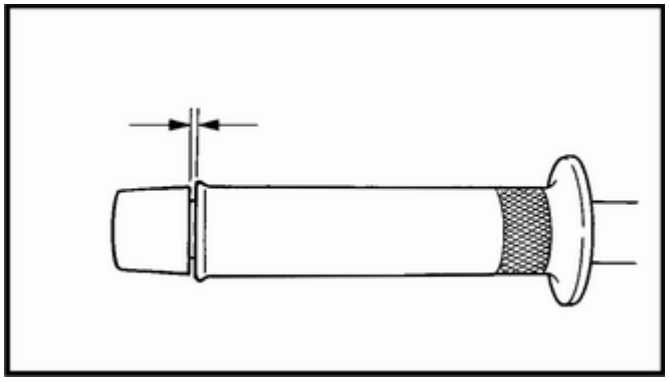
7. Lubricate the inside of the throttle grip with a thin coat of grease and install it onto the handlebar.

8. Install throttle cables.

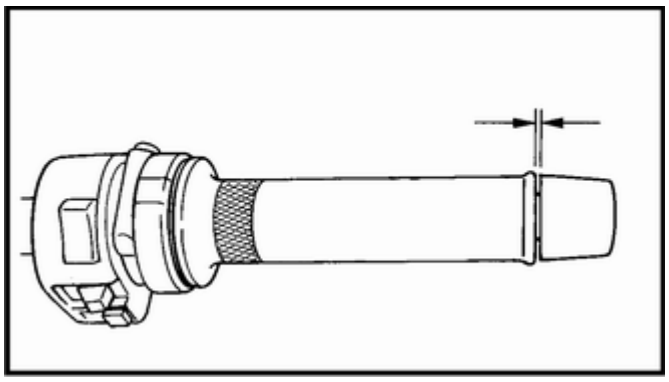


9. Ensure the throttle grip operates smoothly.

10. Install left hand grip weight. There should be 1 ~ 3 mm (0.04 ~ 0.12 in) of clearance a between the throttle grip and the grip weight.



11. Install right hand grip weight. There should be 1 ~ 3 mm (0.04 ~ 0.12 in) of clearance a between the throttle grip and the grip weight.



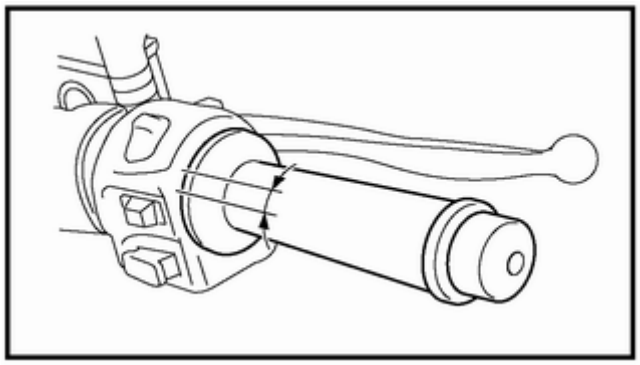
BODY FRAME

Throttle Freeplay Adjustment

Inspection

1. Start the engine, and warm it up thoroughly.

2. Measure the distance the throttle pedal moves before the engine begins to pick up speed. Free play should be 3 - 5 mm.

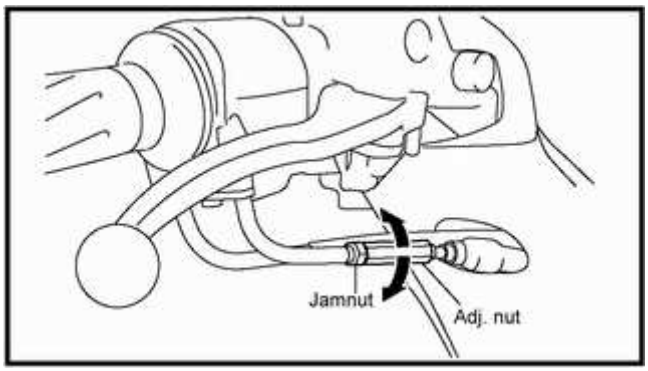


Adjustment

1. Squeeze the end of the rubber boot and slide it far enough to expose the end of the inline cable adjuster.

2. Loosen the adjuster lock nut.

3. Rotate the boot to turn the adjuster until 3-5 mm of freeplay is achieved at the throttle pedal.



NOTE: While adjusting, lightly pull the throttle lever.

4. Tighten the lock nut.

5. Squeeze the end of the rubber boot and slide it over the cable adjuster to its original position.

⚠ WARNING

After adjusting the throttle cable free play, start the engine and turn the handlebars to the right and to the left to ensure that this does not cause the engine idling speed to change.

ELECTRICAL

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ELECTRICAL SYSTEM SERVICE NOTE

Reference the following notes when diagnosing electrical problems.

• Refer to wiring diagram for stator and electrical component resistance specifications.

• When measuring resistance of a component that has a low resistance value (under 10 Ohms), remember to subtract meter lead resistance from the reading.
Connect the leads together and record the resistance.
The resistance of the component is equal to tested value minus the lead resistance.

• Become familiar with the operation of the meter. Be sure leads are in the proper jack for the test being performed (i.e. 10A jack for current readings). Refer to the owner's manual included with the meter for more information.

• Voltage, amperage, and resistance values included in this manual are obtained with a Digital Multi-meter. This meter is acceptable for use when diagnosing electrical problems. Readings obtained with other meters may differ.

• Pay attention to the prefix on the multi-meter reading (K, M, etc.) and the position of the decimal point.

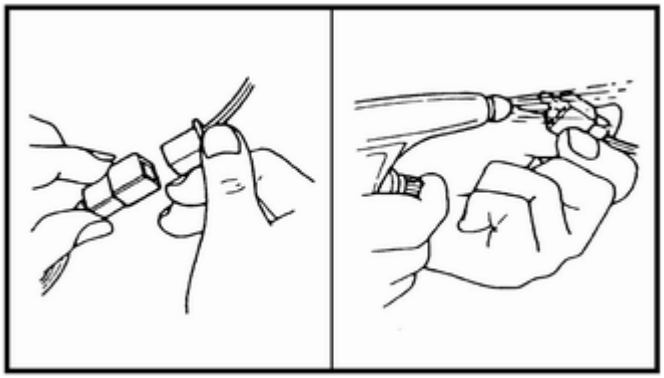
• For resistance readings, isolate the component to be tested. Disconnect it from the wiring harness or power supply.

WIRES COLOR LETTER LIST

Letter	Color	Letter	Color
B	Black	**L/W**	Blue/ White
B/G	Black/ Green	**L/Y**	Blue/Yellow
Bl	Black	**L/G**	Blue/ Green
B/L	Black/Blue	**O**	Orange
B/R	Black/Red	**O/B**	Orange/Black
B/W	Black/ White	**P**	Pink
B/Y	Black/Yellow	**Pu**	Purple
Br	Brown	**R**	Red
Br/L	Brown/Blue	**R/B**	Red/Black
Br/W	Brown/White	**R/W**	Red/White
Br/B	Brown/ Black	**R/Y**	Red/ Yellow
Br/Y	Brown/ Yellow	**R/O**	Red/ Orange
C	Cyan	**W**	White
C/R	Cyan/	**WB**	Water Blue
DB	Deep Brown	**W/B**	White/Black
DG	Deep Green	**W/L**	White/Blue
G	Green	**W/R**	White/Red
G/R	Green/Red	**W/G**	White/Green
G/W	Green/White	**W/Br**	White/Brown
G/Y	Green/ Yellow	**W/Y**	White/Yellow
Gr	Gray	**Y**	Yellow
Gr/ R	Gray/ Red	**Y/B**	Yellow/ Black
G/L	Green/ Blue	**Y/L**	Yellow/ Blue
L	Blue	**Y/R**	Yellow/ Red
L/R	Blue/ Red	**Y/W**	Yellow/ White
L/B	Blue/ Black		

CHECK THE CONNECTION

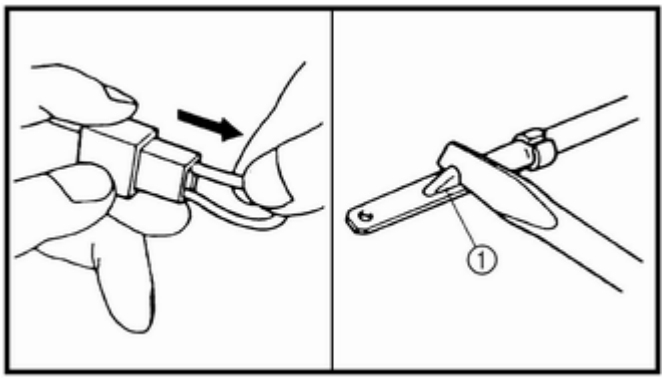
Check the connectors for stains, rust, moisture, etc.



1.Disconnect connector.

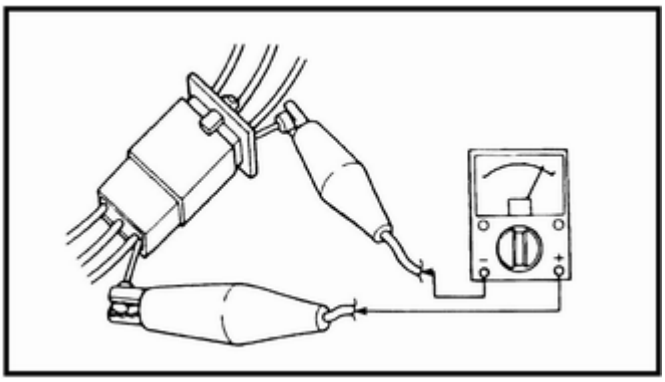
2.Check connector moisture. Dry each terminal with an air blower.

3. Check connector stains/rust. Connect and disconnect the terminals several times.

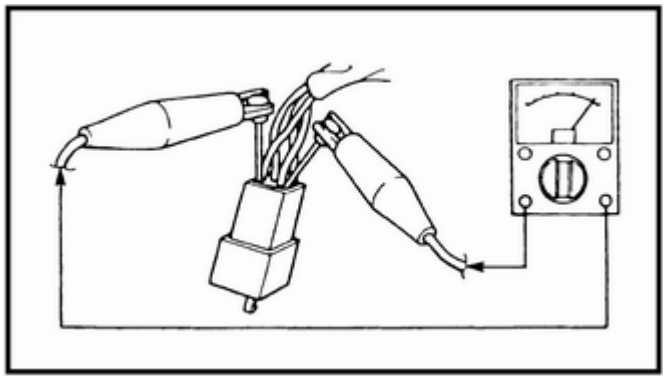


4.Check connector leads looseness. Bend up the pin 1 and connect the terminals.

5. Click two terminal together going to check connector terminals.



6. Check wires continuity by multi-meter. If there is no continuity, clean the terminals.

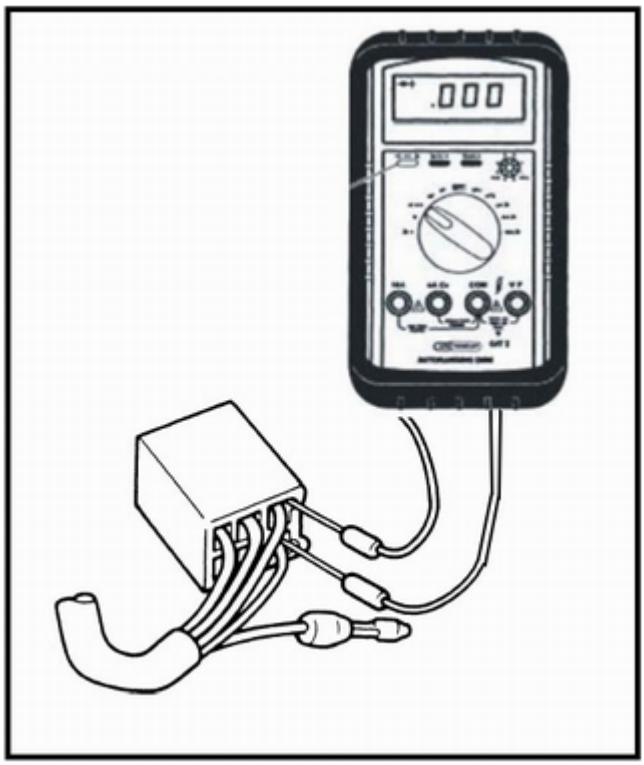


7. Perform steps 1 to 3 when checking the wire harness continuity.

8. As a quick remedy, use a contact revitalizer available at most part stores.

CHECK THE SWITCH

Use a multi-meter to check the terminals for continuity. If the continuity is faulty at any point, replace the switch.



1. Set the multi-meter to “0” before starting the test.

2. The pocket tester should be set to the “.1” range when testing the switch for continuity.

3. Turn the switch on and off a few times when checking it.

ELECTRICAL

CHECK A SWITCH SHOWN IN THE MANUAL

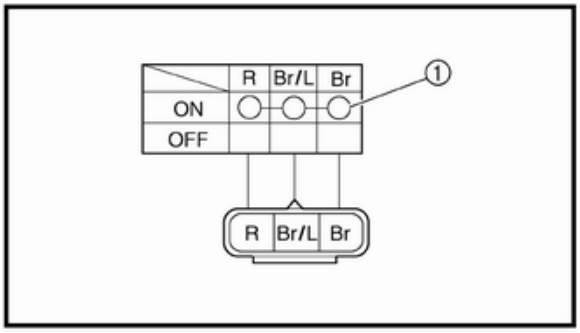
The terminal connections for switches (main switch, handlebar switch, engine stop switch, light switch, etc.) are shown in a chart similar to the one on the right.

This chart shows the switch positions in the column and the switch lead colors in the top row.

For each switch position, "O—O" indicates the terminals with continuity.

The example chart shows that:

① There is continuity between the "Red, Brown/ Blue, and Brown" leads when the switch is set to "ON".



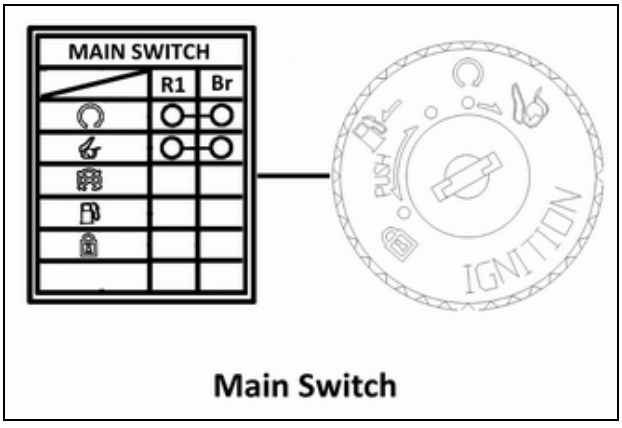
KEY / MAIN SWITCH

1. When the key switch is turned to the "ON" position, there should be continuity between the red (R1) and brown (Br) wires.

2. When the key is turned to the "OFF" position, there should no continuity between any of the wires.

3. When the key is turned to the " " seat open position, there should be continuity between the red (R1) and brown (Br) wires.

4. When the key is turned to the " " " " position, there should no continuity between any of the wires.



HEADLIGHT SWITCH

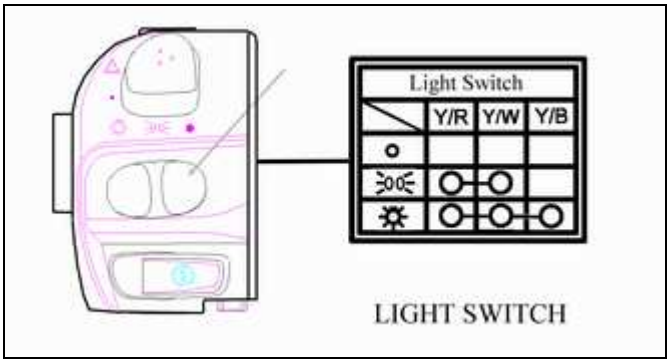
Headlight switch include light and beam switch which light switch local on handlebar by right side and beam switch local on handlebar by left side.

Light Switch

1. When the headlight switch is pushed to the " " position, there should be continuity between the (Y/R & Y/W) wires.

2. When the headlight switch is pushed to the " " position, there should continuity between the (Y/R & Y/W & Y/B) wires.

3. When the headlight switch is pushed to the "OFF" position, there should no continuity between any of the wires.

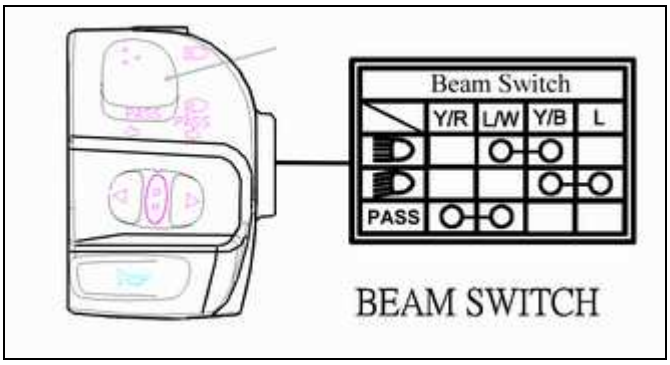


BEAM SWITCH

1. When the beam switch is pushed to the " " position, there should be continuity between the (Y/B & L) wires.

2. When the beam switch is pushed to the " " position, there should be continuity between the (L/W &Y/B) wires.

3. When the beam switch is pressed to the " BOTH" position, there should be continuity between the (Y/R & L/W) wires. Both headlights have high and low beams.

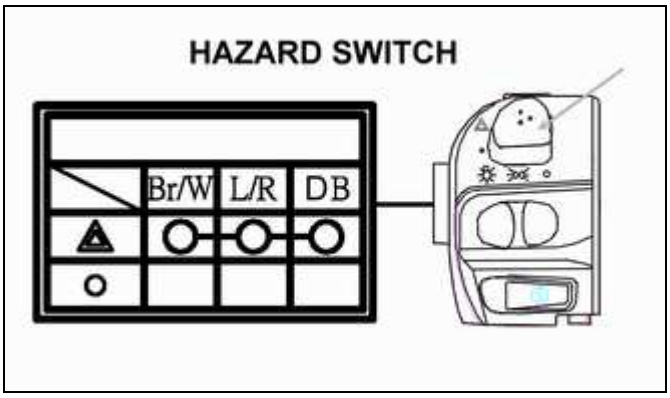


ELECTRICAL

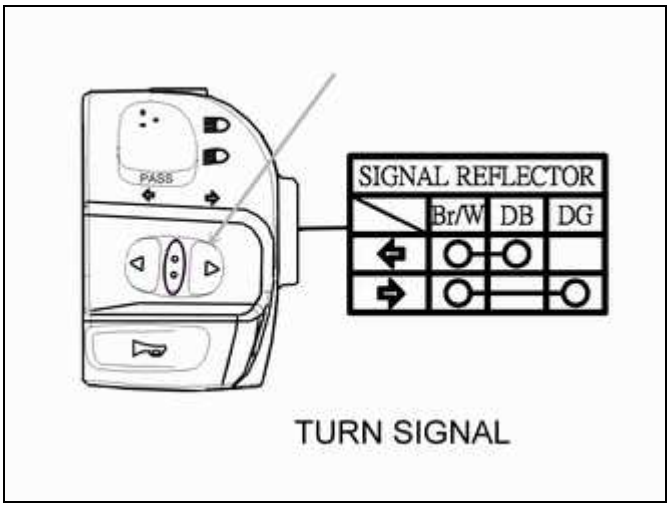
HAZARD SWITCH

1. When the hazard switch is pushed to the " ⚠ " position, there should be continuity between the (Br/W, L/R & DB) wires.

2. When the hazard switch is pushed to the " ○ " position, there should no continuity between any of the wires.

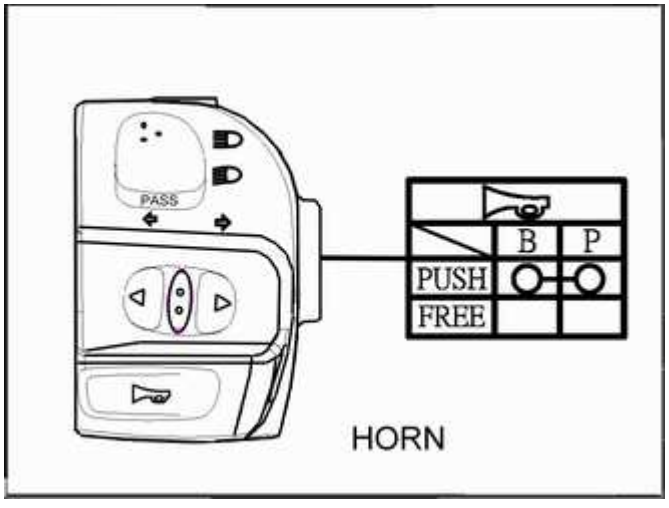


NOTE: The turn signal button will not automatically return to the off position after a turn, the operator should manually move the button to the center position upon completing each turn.



HORN

1. When the switch is pushed down, there should be continuity between the (B & P) wires."
2. When the switch is loosened to the "FREE" position, there should no continuity between any of the wires.



TURN SIGNAL

1. When the switch is pushed to the " ⇦ " position, there should be continuity between the (Br/W & DG) wires.

2. When the switch is pushed to the " ⇨ " position, there should be continuity between the (Br/W & DB) wires."

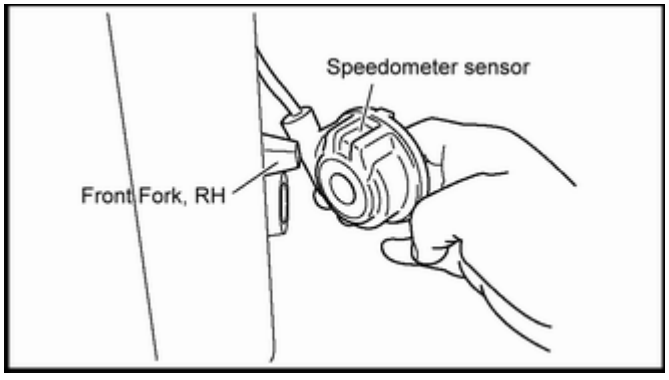
SPEEDOMETER / ODOMETER

The speedometer is located on top of the vehicle dash and will read vehicle speed from 0 to 999.9 km. The gauge will also record the total distance traveled.

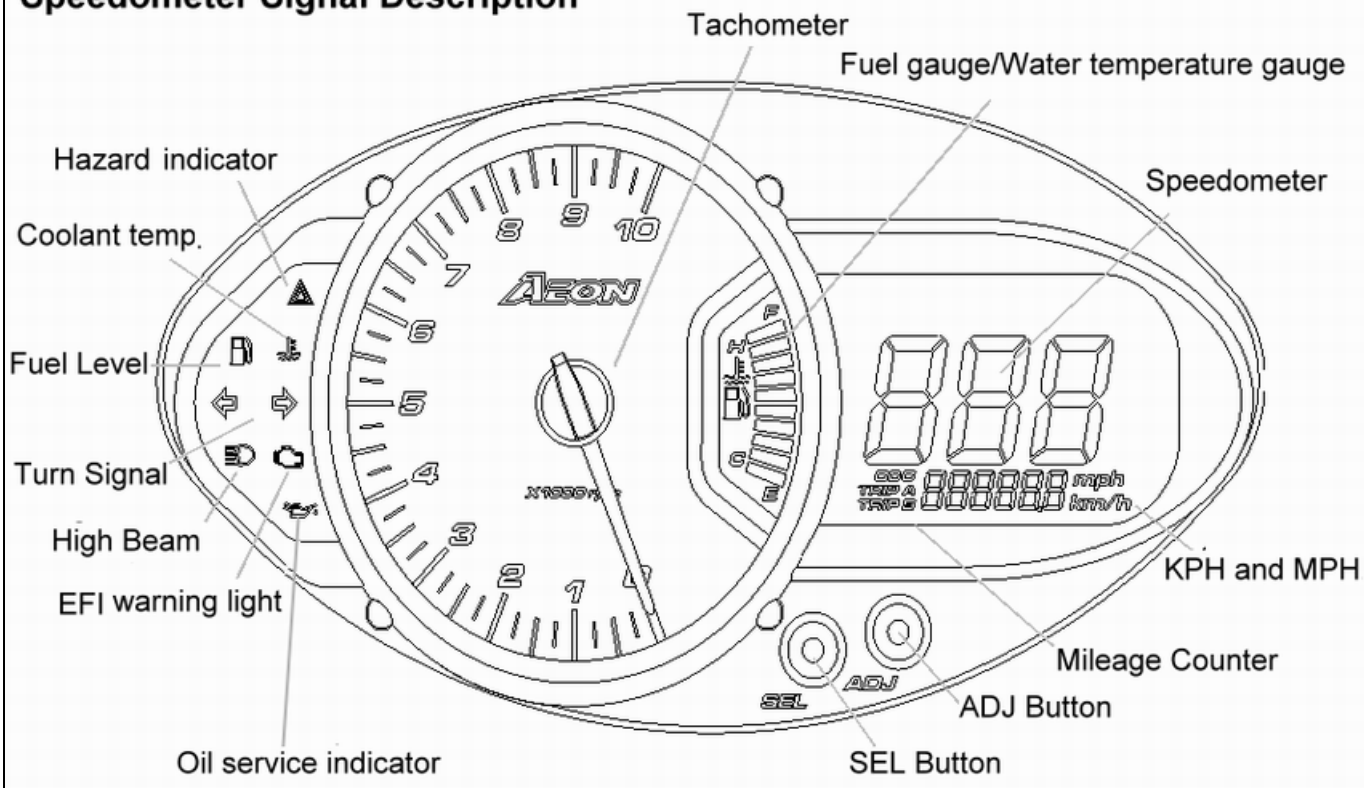
Within the speedometer is a trip odometer that can be set by depressing the set buttons. This feature is especially useful in measuring the distance between each charge cycle.

Speedometer Sensor and Magnet

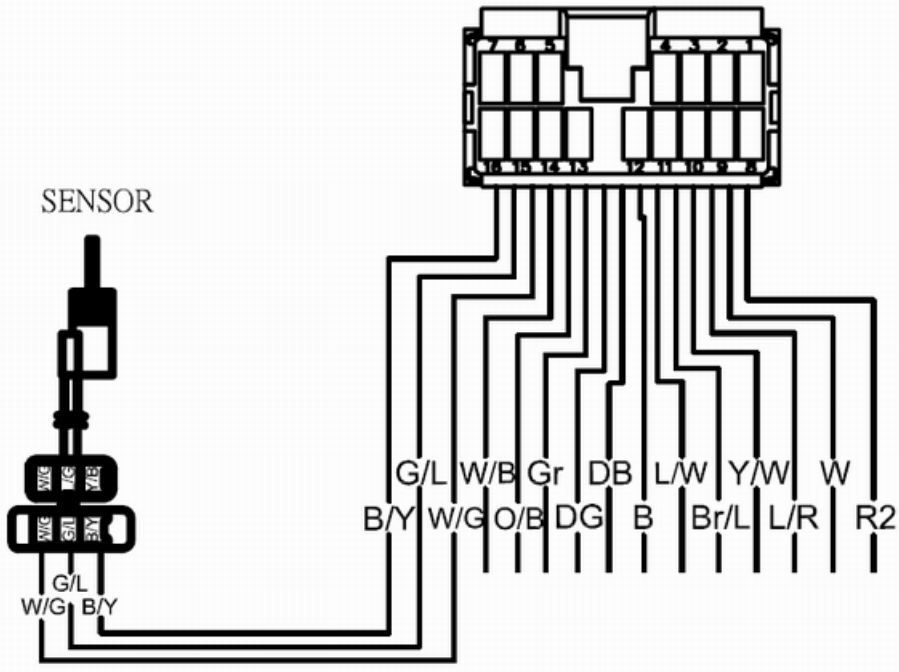
The sensor and magnet are located on front right wheel.



Speedometer Signal Description



SPEEDOMETER CIRCUIT



TERMINALS

PIN 1 : W -- Coolant Gauge
PIN 2 : W/B -- Petrol Gauge
PIN 3 : NO
PIN 4 : W/G -- R.P.M. Sensor
PIN 5 : Y/W -- Light/ Light Switch
PIN 6 : G/L -- R.P.M. Sensor
PIN 7 : B/Y -- R.P.M. Sensor
PIN 8 : L/R -- Hazard Controller
PIN 9: DB -- Signal Lamp, LH, F&R
PIN 10: DG -- Signal Lamp, RH, F&R
PIN 11: L/W -- Light/ Light Switch
PIN 12: O/B -- Blink Lamp (EFI Mal.)
PIN 13: R2 -- Hazard Controller
PIN 14: Br/L -- Horn
PIN 15: B -- Ground
PIN 16: Gr -- Tachometer

ELECTRICAL

BRAKE LIGHT SWITCH

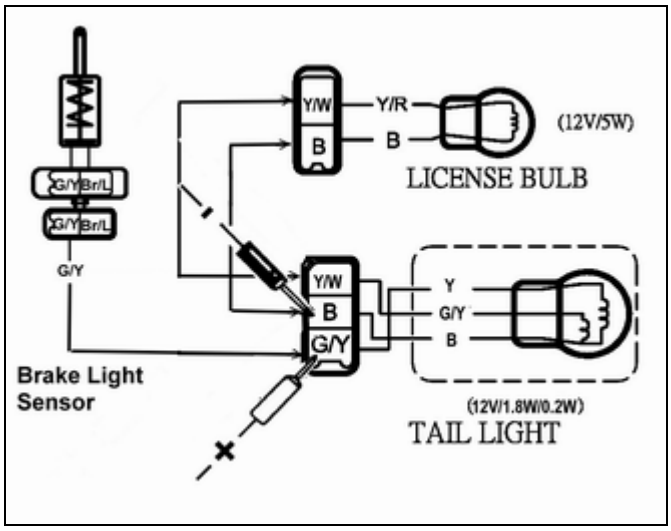
Brake lever utilizes an electrical brake switch that sends voltage to activate the brake light.

1. Locate the brake switches under the brake levers.

2. Disconnect wire harness from brake switch and connect an ohmmeter across the two switch wires.

The reading should be infinite.

3. To act the brake lever and check for continuity between switch contacts. Replace switch if there is no continuity or if the resistance is greater than .5 ohms when the brake is applied with slight pressure.



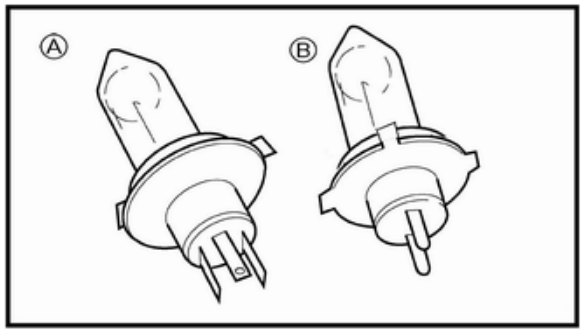
BULBS

Check each bulb and bulb socket for damage or wear, proper connections, and also for continuity between the terminals. Repair or replace the bulb, bulb socket or both. If they are Damaged or worn.

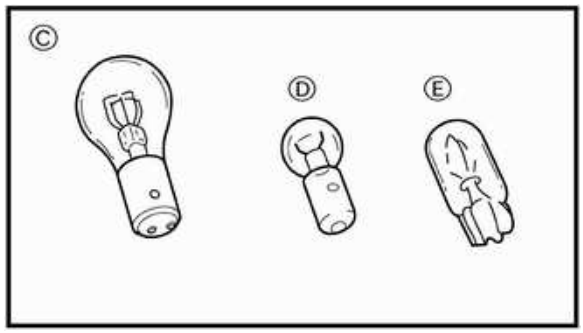
TYPES OF BULBS

The bulbs used on this scooter are shown in the illustration on the left.

1. Bulbs A and B are used for headlights and usually use a bulb holder which must be detached before removing the bulb. The majority of these bulbs can be removed from their respective socket by turning them counterclockwise.



2. Bulb C is used for turn signal and brake/tail lights and can be removed from the socket by pushing and turning the bulb counterclockwise.



3. Bulbs D and E are used for meter and indicator lights and can be removed from their respective socket by carefully pulling them out.

BULB INSPECTION

The following procedure applies to all of the bulbs.

1. Remove bulb.

⚠ CAUTION

Be sure to hold the socket firmly when removing the bulb. Never pull the lead; otherwise it may be pulled out of the terminal in the coupler.

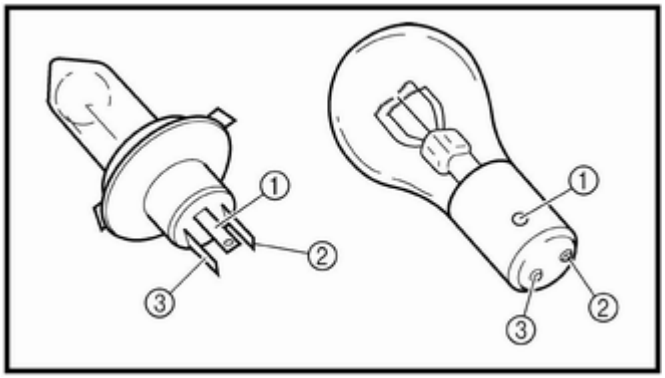
Avoid touching the glass part of the headlight bulb to keep it free from oil, otherwise the transparency of the glass, the life of the bulb and the luminous flux will be adversely affected. If the headlight bulb gets soiled, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.

⚠ WARNING

Since the headlight bulb gets extremely hot, keep flammable products and your hands away from the bulb until it has cooled down.

2.Inspect bulb for continuity with the multi-meter, If discontinuity Replace the bulb.

NOTE: Before checking for continuity, set the multi-meter to "0" and to the "Ω∗1" range.



3.Connect the tester positive probe to terminal ① and the tester negative probe to terminal ②, and check the continuity.

4.Connect the tester positive probe to terminal ① and the tester negative probe to terminal ③, and check the continuity.

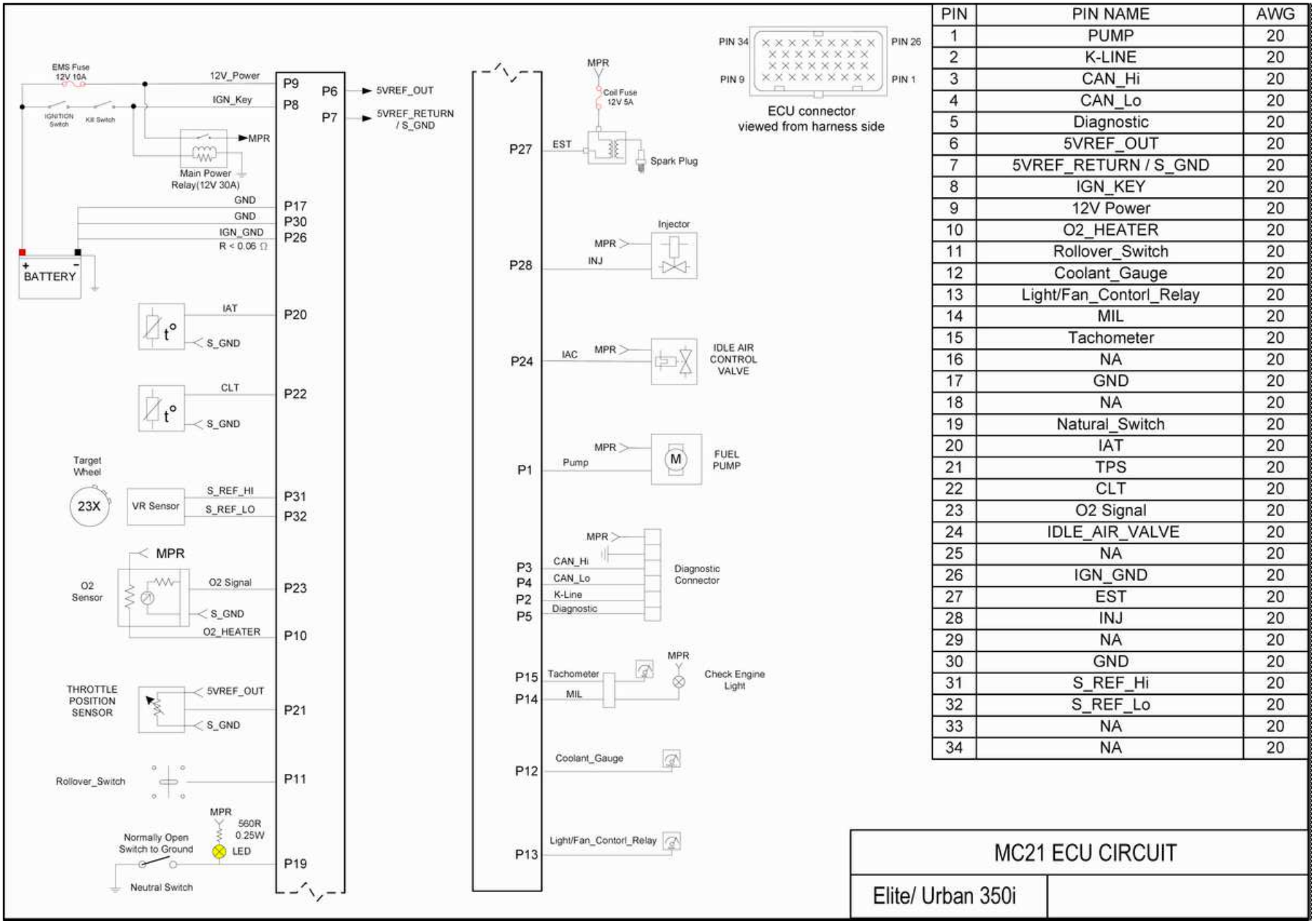
5.If either of the readings indicates no continuity, replace the bulb.

BULB SOCKETS INSPECTION

1. Install a good bulb into the bulb socket.

2. Connect the multi-meter probes to the respective leads of the bulb socket.

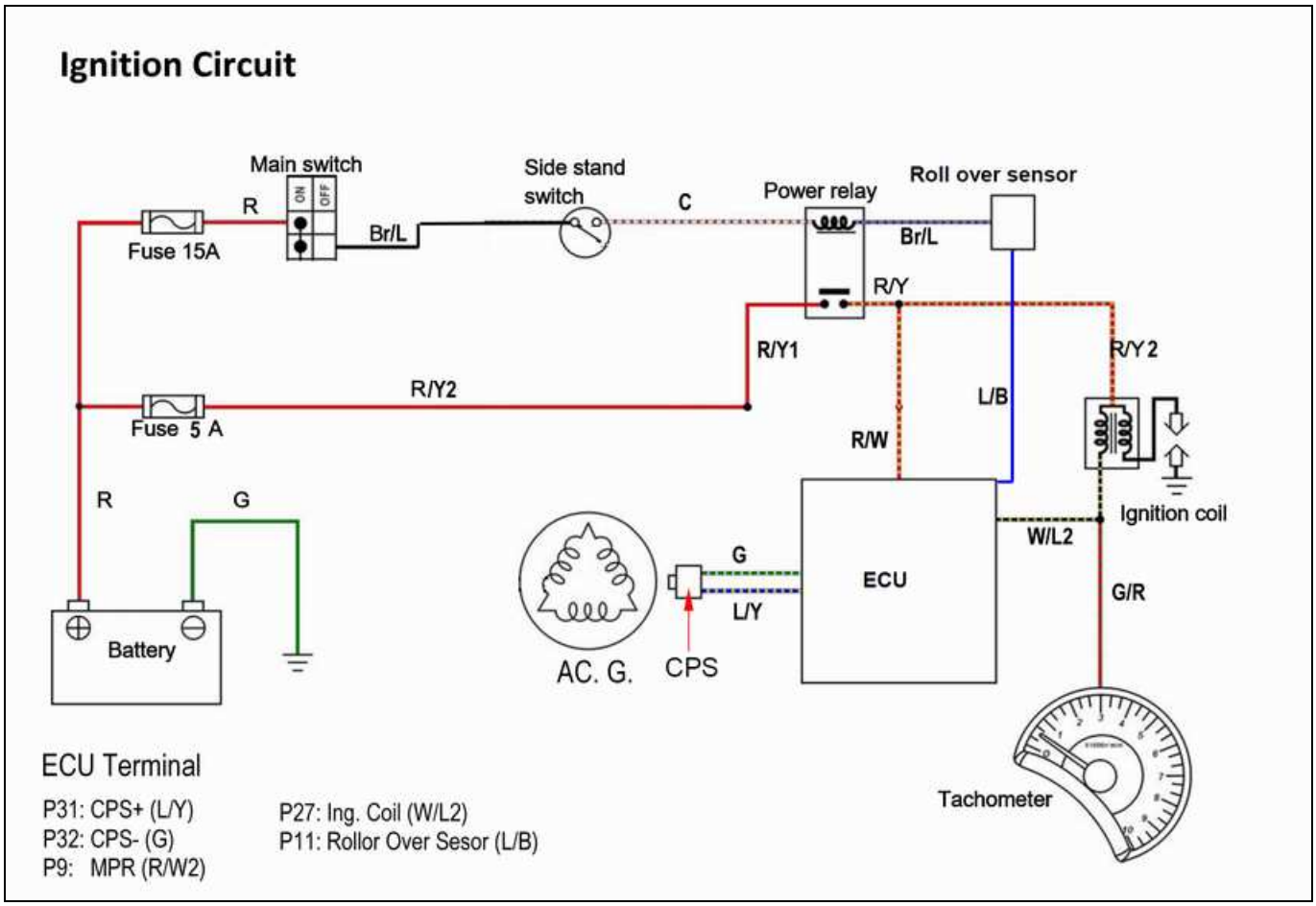
3. Check the bulb socket for continuity. If any of the readings indicate no continuity, replace the bulb socket.



PIN	PIN NAME	AWG
1	PUMP	20
2	K-LINE	20
3	CAN_Hi	20
4	CAN_Lo	20
5	Diagnostic	20
6	5VREF_OUT	20
7	5VREF_RETURN / S_GND	20
8	IGN_KEY	20
9	12V Power	20
10	O2_HEATER	20
11	Rollover_Switch	20
12	Coolant_Gauge	20
13	Light/Fan_Contorl_Relay	20
14	MIL	20
15	Tachometer	20
16	NA	20
17	GND	20
18	NA	20
19	Natural_Switch	20
20	IAT	20
21	TPS	20
22	CLT	20
23	O2 Signal	20
24	IDLE_AIR_VALVE	20
25	NA	20
26	IGN_GND	20
27	EST	20
28	INJ	20
29	NA	20
30	GND	20
31	S_REF_Hi	20
32	S_REF_Lo	20
33	NA	20
34	NA	20

MC21 ECU CIRCUIT

Elite/ Urban 350i

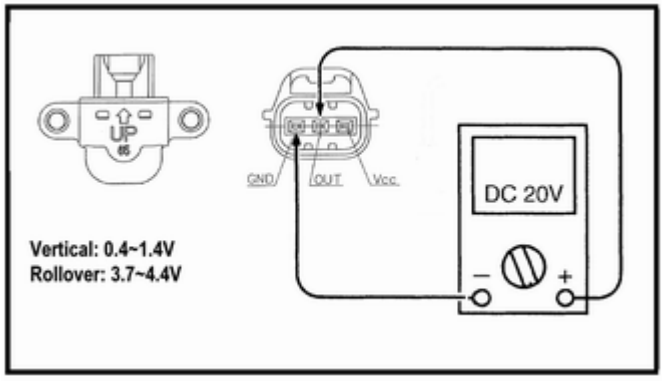


RPM LIMITER SPECIFICATIONS

NOTE: The Scooter is limited through the ECU box located on the right frame under the seat. In forward, the ECU reads the RPM's from the stator. The ECU acts as a limiter when the peak RPM is met.

IF THE IGNITION SYSTEM FAILS TO OPERATE (NO SPARK OR INTERMITTENT SPARK) FOLLOWING PROCEDURE TO CHECKING.

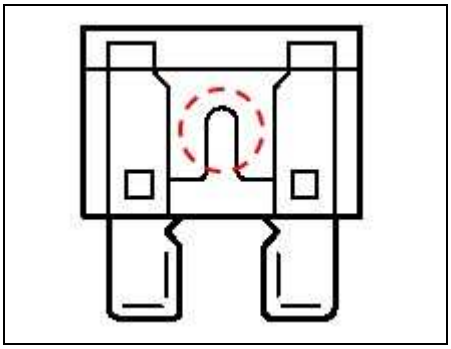
◎ Rollover Switch



Check the rollover switch output voltage. The normal voltage should be 0.4~1.4V. If rollover condition voltage should be reaching 3.7~4.4V.

◎ FUSE

Ensure fuse continuity. If broken, replace the fuse.



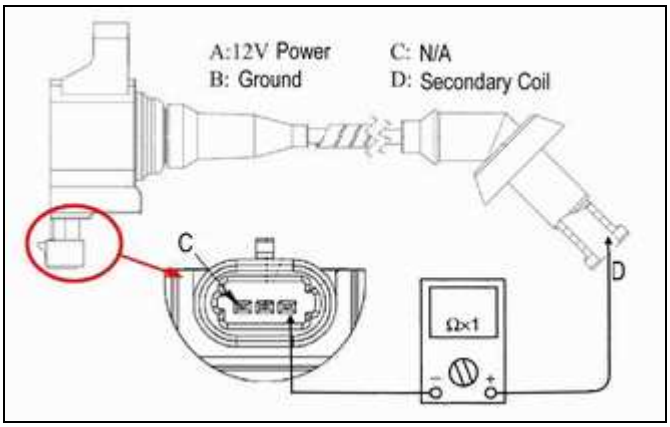
◎ BATTERY

Check the battery condition. The open-circuit voltage should be 12.8 V or more at 20 °C (68 °F).

If battery less than 11.8V inspect regulator and stator, recharge or replace the battery.

Ignition Coil Resistance

5. Check that the secondary coil has the specified resistance.



Secondary coil resistance

5.3 ~ 6.7 kΩat 20 °C (68 °F)

6. If ignition coil resistance reading overdue specified, replace the ignition coil.

◎ MAIN SWITCH

Refer to "KEY/ MAIN SWITCH".

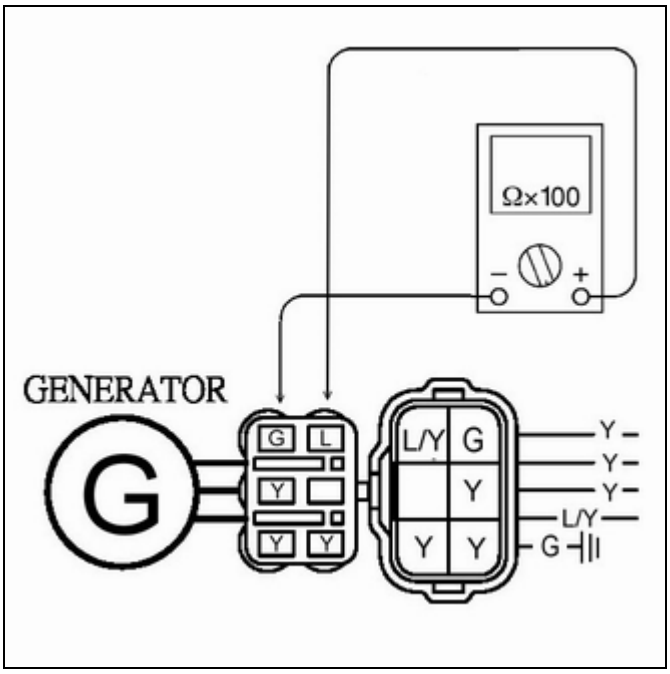
◎ PICKUP COIL

1. Disconnect the A.C. stator coupler from the wire harness.
2. Connect the multi-meter (Ω∗100) to the pickup coil terminal.

Probe (+)・L (blue) terminal.

Probe (–) G (green) terminal.

3. Check the pickup coil for the specified resistance.



4. If stator pick up coil resistance reading overdue specified, replace completely stator.

Pickup coil (CPS) resistance:

110 ~ 500Ω・at 20 °C (68 °F)

◎ STATOR COIL

1. **Resistance Value of Each Stator Leg**

Measure the resistance value of each of the three-stator legs: Y1 to Y2, Y1 to Y3, and Y2 to Y3.

Each should measure **0.3--1.2 ohms**

When measuring any of the Yellow wires to ground, the reading should be infinite (open).

NOTE: If there are any significant variations in ohm's readings between the three legs; it is an indication that one of the three-stator legs maybe weak or failed.

2. **Resistance Value of Stator Leg to Ground**

Measure the resistance value of each of the stator legs to ground: Y1 to Ground, Y2 to Ground and Y3 to Ground.

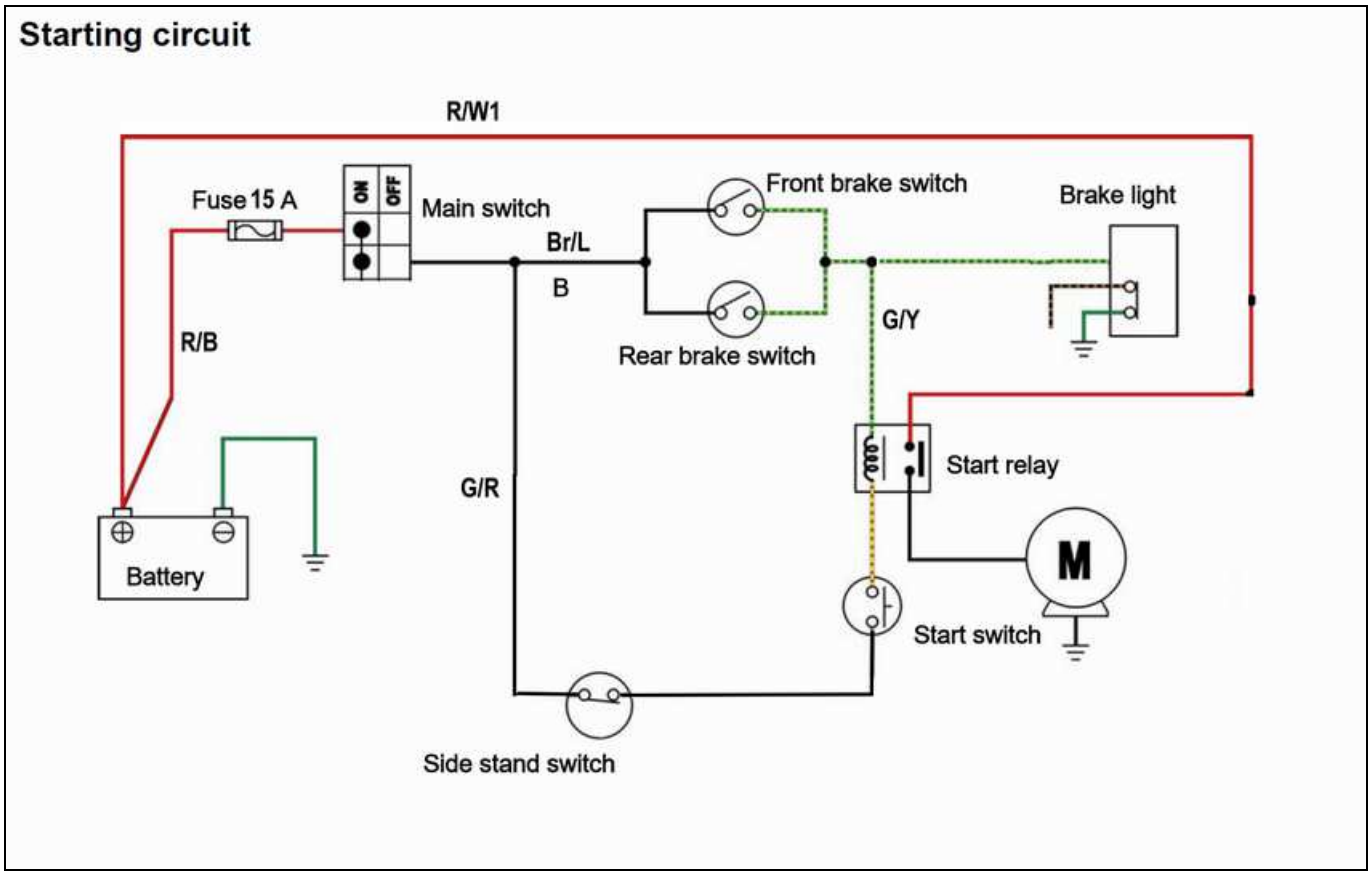
NOTE: Any measurement other than Infinity (open) will indicate a failed or shorted stator leg.

3. **Measure AC Voltage Output of Each Stator Leg at Charging RPM with a voltmeter set to Volts AC.**

4. Place the red lead on the tester in the 10A jack.
5. Turn the selector dial to the Volts AC position.
6. Start the engine and let it idle.
7. Separately test each 'leg' of the stator by connecting the meter leads to the wires leading from the alternator (Y1 to Y2, Y1 to Y3, Y2 to Y3).
8. Alternator Current Output Reading should be no less than **30--40V AC above 2000 RPM on each 'leg'**.

NOTE: If one or more of the stator leg output AC voltage varies significantly from the specified value, the stator may need to be replaced.

ELECTRICAL



VOLTAGE DROP TEST

The Voltage Drop Test is used to test for bad connections. When performing the test, you are testing the amount of voltage drop through the connection. A poor or corroded connection will appear as a high voltage reading. Voltage drop shown on the meter when testing connections should not exceed 0.1 VDC per connection or component.

To perform the test, place the meter on DC volts and place the meter leads across the connection to be tested. Refer to the chart on next page to perform voltage drop tests on the starter system.

Voltage Drop should not exceed: 0.1 DC volts per connection

Use the illustration above and procedure below when troubleshooting a “No Start” condition.

STARTING CIRCUIT OPERATION

The starting circuit on this model consists of the starter motor, starter relay, brake light switch, and ECU and kick stand switch. If the main switch is “START” position, the starter motor can be operated only if:

1. The kickstand on ground (kickstand tough ground). Or
2. The brake lever is not pressed (the brake light switch is closed).

IF THE STARTING MOTOR FAILS TO OPERATE FOLLOWING PROCEDURE TO CHECKING.

◎ FUSE

Ensure fuse (main, ignition, signaling system) continuity. If broken, replace the fuse.

◎ BATTERY

Check the battery condition. The open-circuit voltage should be 12.8 V or more at 20 °C (68 °F).

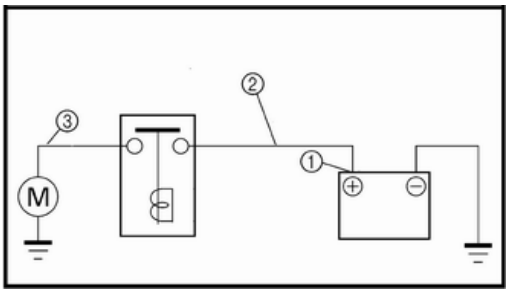
If battery less than 11.8V inspect regulator and stator, recharge or replace the battery.

ELECTRICAL

◎ STARTER MOTOR

The starter motor is a complete service part. If it is determined that the starter motor is the failed part, replace as needed.

1. Connect the battery (+) terminal① and starter motor cable②
2. Using a jumper ③ connect start motor (-) terminal and frame ground.



3. Check the operation of the starter motor.

⚠ WARNING

This check is likely to produce sparks, so be sure that no flammable gas or fluid is in the vicinity.

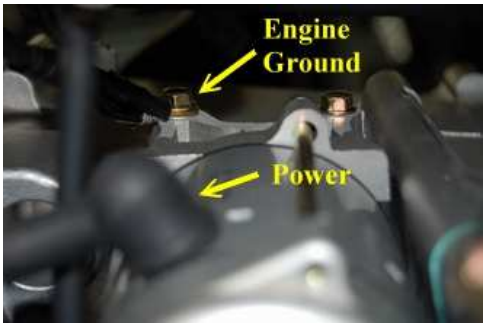
⚠ CAUTION

A wire that is used as a jumper wire must have the equivalent capacity or more as that of the battery wire, otherwise the jumper wire may burn.

4. If start motor does not turn or has gride noise, repair or replace the start motor.

STARTER MOTOR SERVICE

The starter motor is a complete service part. If it is determined that the starter motor is the failed part, replace as needed. See the parts manual for correct part numbers.



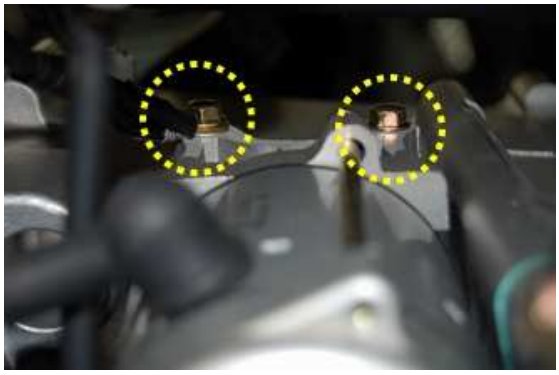
STARTER MOTOR DISASSEMBLY

NOTE: Use only electrical contact cleaner to clean starter motor parts. Other solvents may leave a residue or damage internal parts and insulation.

NOTE: Some starter motors may not be serviceable. Replacement of entire assembly may be required.

Check the parts manual for replacement part information.

1. Disconnect the negative battery cable and starter motor harness. Remove the (2) bolts from the starter and pull it from the engine.



2. Remove the 2 main screws.

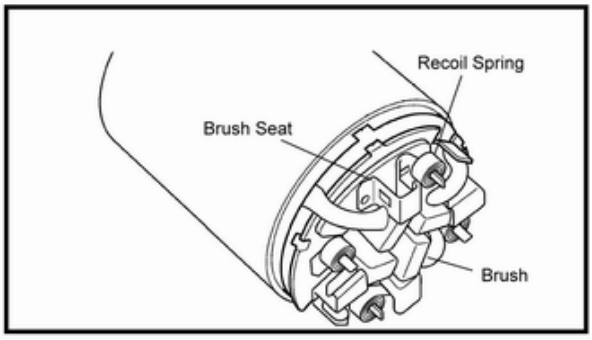
3. Remove magnet housing while holding the armature and brush holder section together.

ELECTRICAL

STARTER BRUSH INSPECTION / REPLACEMENT

1. Release the brush coil spring away.

2. Push the armature out of case.



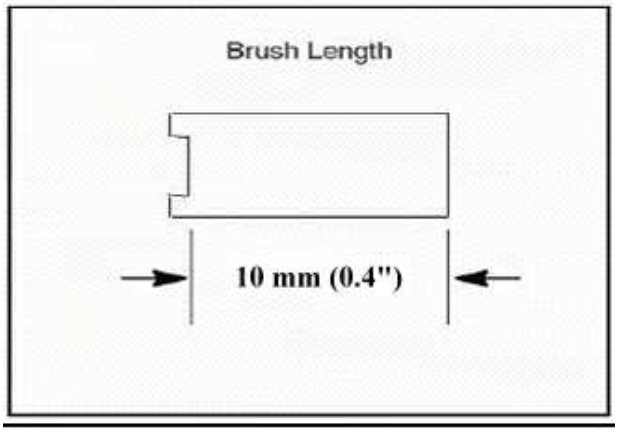
3. Using an Ohmmeter, measure the resistance between the cable terminal and the insulated brush. The reading should be .3 ohms or less. Measure the resistance between the cable terminal and brush housing. Make sure the brush is not touching the case. The reading should be infinite (no reading).

4. Remove the brush plate and brushes. Measure the brush length and replace if worn past the service limit.

Brush Length Service Limit
10 mm (0.40“)

5. Inspect the surface of the communicator for wear or discoloration. See Armature Test.

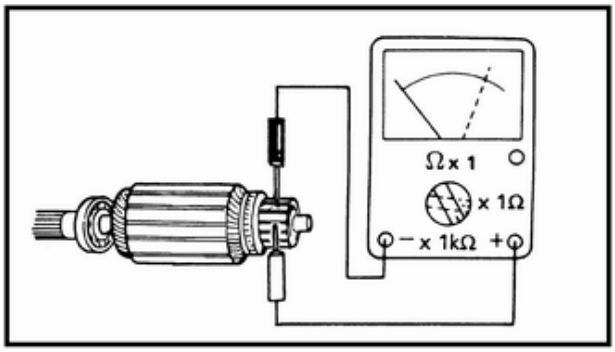
4. Be sure that the terminal bolt insulation washer is properly seated in the housing and the tab on the brush plate engages the notch in the brush plate housing.



ARMATURE TEST

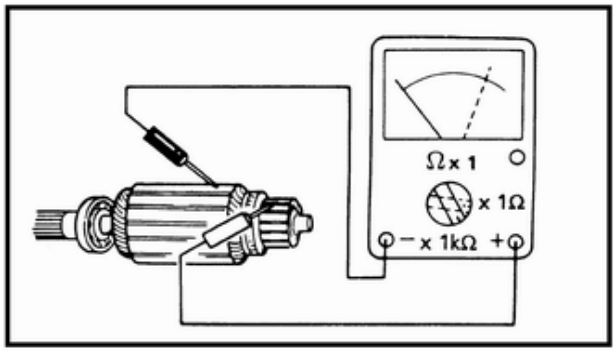
1. Inspect surface of communicator. Replace if excessively worn or damaged.

2. Using a digital multi-tester, measure the resistance between each of the communicator segments. The reading should be 3 ohms or less.



Armature coil resistance Continuity
Less 3Ω at 20 °C (68 °F)

4. Measure the resistance between each communicator segment and the armature shaft. The reading should be infinite. (No continuity)



Insulation check
Infinite Ω at 20 °C (68 °F)

5. Check communicator bars for discoloration. Bars discolored in pairs indicate shorted coils, requiring replacement of the starter motor.

6. Place armature in a growler. Turn growler on and position a hacksaw blade or feeler gauge lengthwise 3mm(1/8〃) above armature coil laminates. Rotate armature 360°. If hacksaw blade is drawn to armature on any pole, the armature is shorted and must be replaced.

7. Inspect the permanent magnets in starter housing. Make sure they are not cracked or separated from housing.

CAUTION
Use care when handling the starter housing. Do not drop or strike the housing, as magnet damage is possible. If the magnets are damaged, the starter must be replaced.

STARTER REASSEMBLY

1. Place armature in field magnet casing.
2. Inspect and replace the O-rings if damaged.
3. Install case sealing O-ring. Make sure O-ring is in good condition and not twisted on the case. Lubricate the ends of the armature shaft and oil seal with a light film of grease, and install housing.
4. Pushing back brushes while installing armature shaft. Install the coil spring behind brush.
5. Reinstall starter motor housing screws and washers. Make sure O-rings are in good condition and seated in groove.

Tighten sufficiently.

6. Reinstall the starter motor to the engine.

◎ STARTER RELAY

The starter relay consists of a simple 2-way circuit. Power is present at the (R/B) wire from the battery. Once the switching side of the relay receives power from the brake switch (G/Y) and a ground path from the starter button (G/R), battery power is sent to the starter motor to crank the engine.

1. Remove the starter relay from the wire harness.
2. Connect the pocket tester (.1) and the battery (12 V) to the starter relay terminals.
3. Connect **Battery (+) terminal** with relay **G/R** wire ①.
Connect **Battery (–) terminal** with relay **Br** wire ②.
4. Connect **multi-meter (+) probe** with relay **R terminal** ③.
Connect **multi-meter (–) probe with · ground terminal** ④.
5. Check the starter relay for continuity. If relay is in continuity, replace the start relay.

◎ MAIN SWITCH

Refer to **"KEY/MAIN SWITCH"** at above. If main switch isn't continuity, replace the main switch.

◎ ROLLOVER SWITCH

Refer to **"ROLLOVER SWITCH"** at above. If transmission switch isn't correct, repair or replace the main switch.

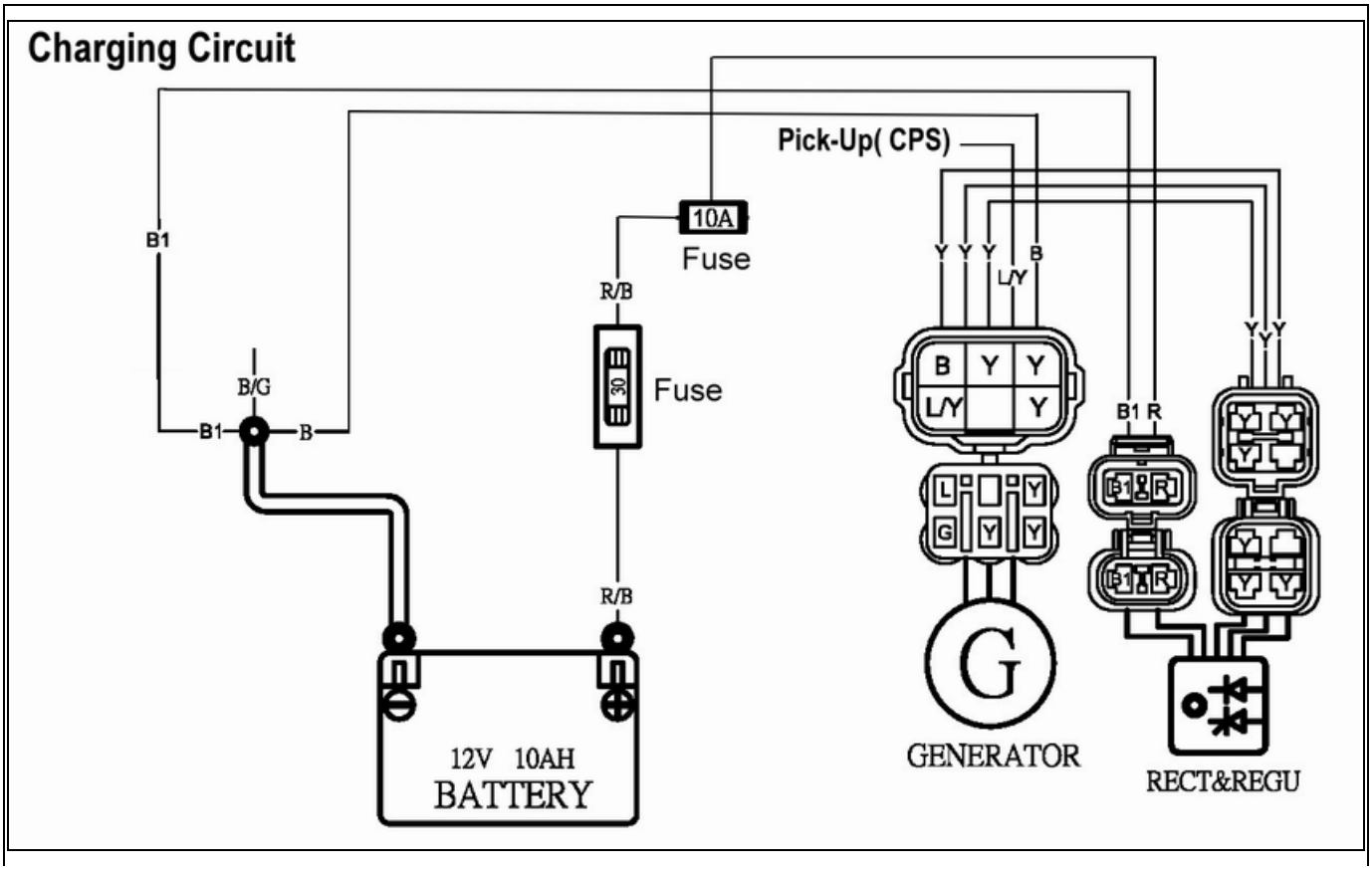
◎ BRAKE LIGHT SWITCH

Refer to **"BRAKE LIGHT SWITCH"** at above. If brake light switch isn't continuity, replace the brake light switch.

◎ STARTING WIRE CONNECTION

Refer to **"CIRCUIT DIAGRAM"** to check properly connect the starting system. If starting wires is poor continuity, replace the wires.

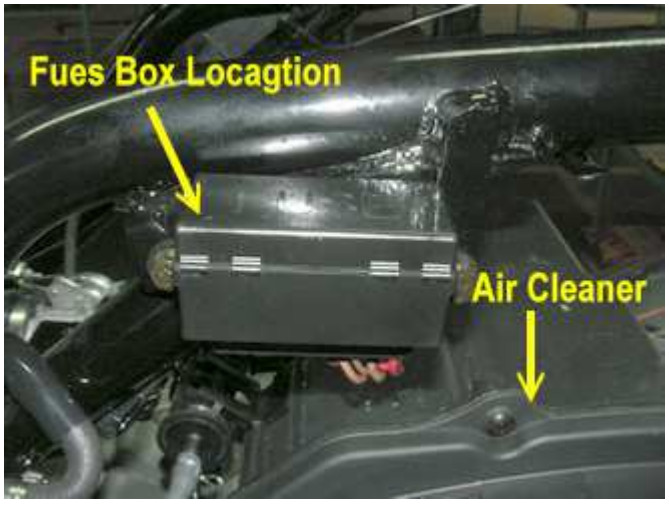
ELECTRICAL



IF THE BATTERY IS NOT CHARGED FOLLOWING PROCEDURE TO CHECKING.

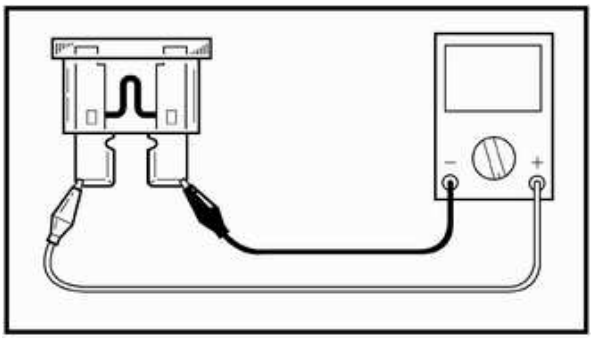
◎ MAIN FUSE

1. The main fuse box is located in left panel and above air cleaner which be fasten on left frame..



2. A 15 Amp fuse protects the main electrical system, a 30 Amp fuse protects charging system, two 10 Amp fuses protects the light and EFI system, a 5 Amp fuse protects ignition system.

3. Refer to **"KEY/MAIN SWITCH"** at above and ensure fuse continuity. If broken, replace the fuse.



◎ CURRENT DRAW - KEY OFF

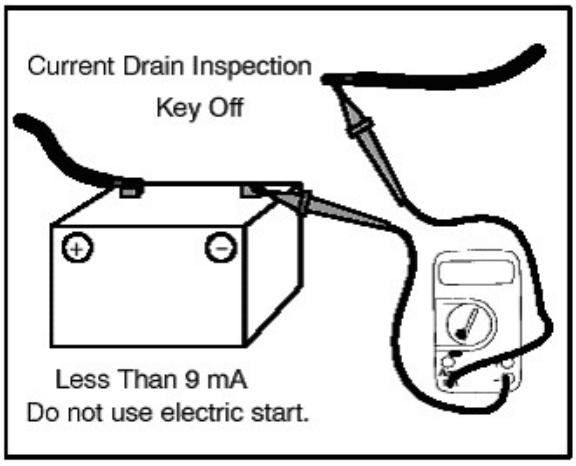
⚠ CAUTION
Do not connect or disconnect the battery cable or ammeter with the engine running. Damage will occur to light bulbs and speed limiter.

Connect an ammeter in series with the negative battery cable. Check for current draw with the key off.

If the draw is excessive, loads should be disconnected from the system one by one until the draw is eliminated. Check component wiring as well as the component for partial shorts to ground to eliminate the draw.

Current Draw - Key Off:
Maximum of .02 DCA (20 mA)

1. The "break even" point of the charging system is the point at which the alternator overcomes all system loads (lights, etc.) and begins to charge the battery.
Depending on battery condition and system load, the break-even point may vary slightly. The battery should be fully charged before performing this test.
2. Clamp an inductive ammeter or connect an ammeter (set to DC amps) in series between the negative battery cable and terminal.



3. Connect a tachometer according to manufacturer's instructions.
4. With engine off and the key and kill switch in the ON position, the ammeter should read negative amps (battery discharge). Reverse meter leads if a positive reading is indicated.
5. Shift transmission into neutral and start the engine. **If using an ammeter in series, start engine with kick-start only.**
6. Turn headlight on high beam and apply the brake light. Increase engine RPM while observing ammeter and tachometer.
7. Note RPM at which the battery starts to charge (ammeter indication is positive).
8. With lights and other electrical load off, this should occur at approximately 1500 RPM or lower.
9. Turn the lights on and lock parking brake to keep brake light on.
10. Repeat test, observing ammeter and tachometer. With lights on, charging should occur at or below 2000 RPM.

◎ ALTERNATOR OUTPUT TEST (AC AMP)

This test measures AC amperage from the alternator.

⚠ CAUTION
This test simulates a "full load" on the alternator. Do not perform this test longer than required to obtain a reading or the alternator stator windings may overheat. Do not exceed idle rpm during this test.

To Calculate Available Alternator Output
I=P/E, 150W / 12V = 12.5 Amps I =
I = Current in Amps
P = Power in Watts
E = Electromotive Force (Volts)
Alternator Current Output:
Minimum of 5 AC Amps

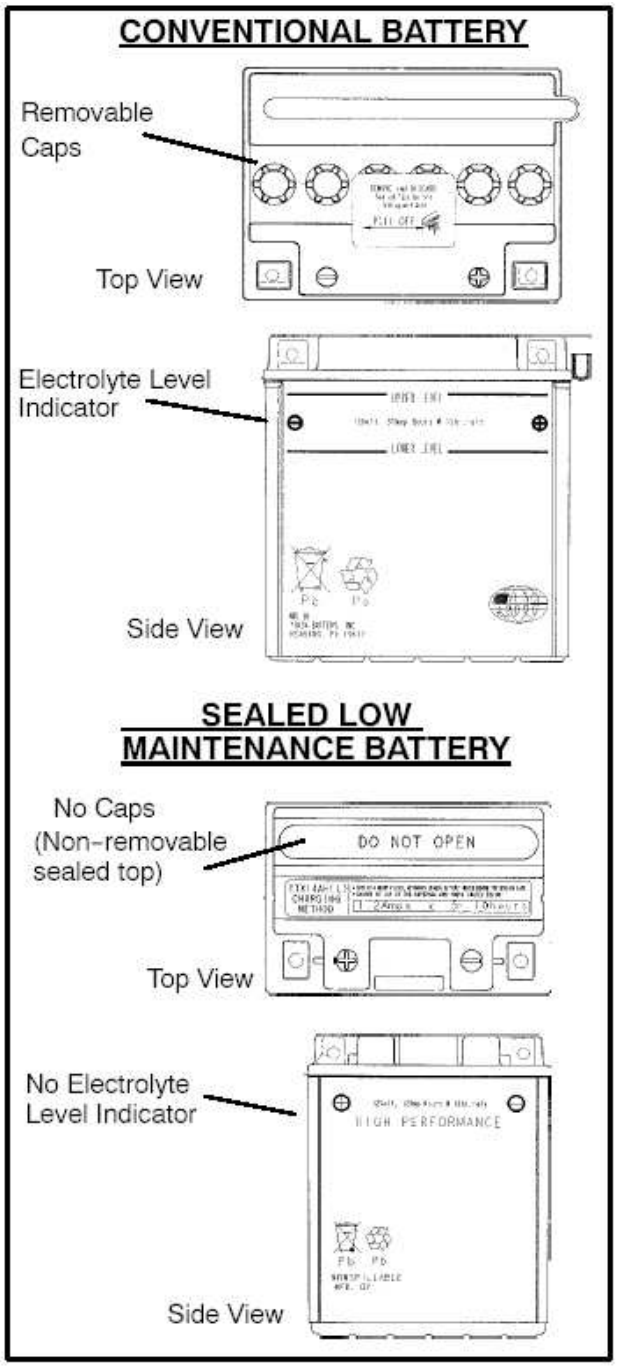
1. Maximum alternator output will be indicated on the meter. It is *not* necessary to increase engine RPM above idle.
2. Place the red lead on the tester in the 10A jack.
3. Turn the selector dial to the AC amps position.
4. Connect the meter leads to the wires leading from the alternator (see schematic for proper wiring colors).
5. Start the engine and let it idle. Reading should be a minimum of 5A at idle.

◎BATTERY IDENTIFICATION

NOTICE: It is important to identify what type of battery you have installed in your ATV. Different types of batteries require different service procedures.

Proper servicing and upkeep of your battery is very important for maintaining long battery life.
Your ATV may have a Conventional Battery or a Sealed Low Maintenance Battery. To identify which type of battery your ATV has, refer to the illustration below and follow the correct service and charging procedures that follow in the manual.

ELECTRICAL



SEALED LOW MAINTENANCE BATTERY

NOTE: All Low Maintenance batteries are fully charged and tested at the factory before installation. Expected shelf life varies upon storage conditions. As a general rule before placing the battery into service, check the battery condition and charge accordingly.

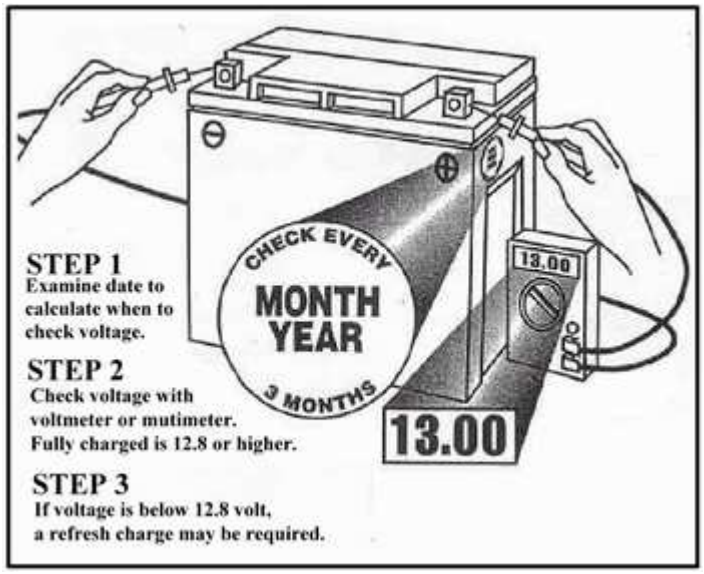
BATTERY CHECK

1. Check the date label on the side of the battery to calculate when to check voltage. The battery should be checked every 3 months.

2. Check the voltage with a voltmeter or multi-meter.

A fully charged battery should be 12.8 V or higher.

3. If the voltage is below 12.8 V, the battery will need to be recharged.



New Batteries: Batteries must be fully charged before use or battery life can be reduced by 10-30% of full potential.

Charge battery for 3—5 hours using a variable rate charger. Do not use the alternator to charge a new battery. A high rate battery charger can cause battery damage.

Low Maintenance batteries are permanently sealed at the time of manufacture. The use of lead--calcium and AGM technology instead of lead--antimony allows the battery acid to be fully absorbed. For this reason, a Low Maintenance battery case is dark and the cell caps are not removable, since there is no need to check electrolyte level.

NEVER attempt to add electrolyte or water to a Low Maintenance battery. Doing so will damage the case and shorten the life of the battery. Refer to the Battery Activation and Maintenance Video (PN 9917987) for proper instruction on servicing Low Maintenance batteries.

ELECTRICAL

NEVER attempt to add electrolyte or water to a Low Maintenance battery. Doing so will damage the case and shorten the life of the battery. Refer to the Battery Maintenance Video (PN 9917987) for proper instruction on servicing Low Maintenance batteries.

How To service a Low Maintenance battery:

1. Remove battery from the vehicle

2. Test battery with a voltage meter or load tester to determine battery condition. This will determine the length of time required to charge the battery to full capacity. Refer to capacity table.

3. Charge battery using a variable rate charger.

SEALED LOW MAINTENANCEBATTERY CHARGING

If battery voltage is 12.8 V or less, the battery may need recharging. When using an automatic charger, refer to the charger manufacturer's instructions for recharging. When using a constant current charger, use the following guidelines for recharging.

NOTE: Always verify battery condition before and 1-2 hours after the end of charging.

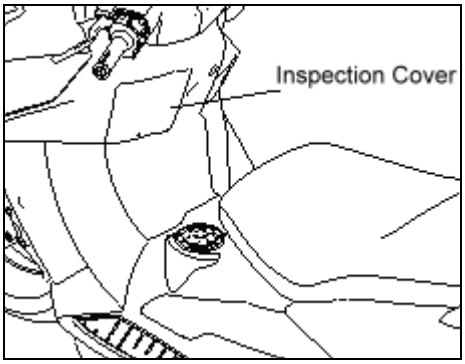
WARNING: An overheated battery could explode, causing severe injury or death. Always watch charging times carefully. Stop charging if the battery becomes very warm to the touch. Allow it to cool before resuming charging.

BATTERY CHARGING REFERENCE TABLE

State of Charge	VOLTAGE	ACTION	CHARGE TIME
100%	12.8-13.0V	None	FULL None Required
75%	12.5-12.8V	Slight Charge	3-6 Hours @ 0.5 A
50%	12-12.5V	Charge	5-11 Hours @ 0.5 A
25%	11.5-12.0V	Charge	13+ Hours @ 0.5 A Check Charging
0%	Less than 11.5v	Charge	20 Hours @ 0.5 A Battery may be dead

SEALED LOW MAINTENANCE BATTERY INSPECTION/ REMOVAL

The battery is located under left handlebar and inside of inspection cover.



1. Disconnect holder strap.

2. Disconnect battery negative (-) (black) cable first, followed by the positive (+) (red) cable.

⚠ CAUTION

Whenever removing or reinstalling the battery, disconnect the negative (black) cable first and reinstall the negative cable last!

3. Remove the battery.

SEALED LOW MAINTENANCE BATTERY INSTALLATION

1. Clean battery cables and terminals with a stiff wire brush. Corrosion can be removed using a solution of one cup water and one tablespoon baking soda. Rinse well with clean water and dry thoroughly.

2. Route the cables correctly.

3. Reinstall battery, attaching positive (+) (red) cable first and then the negative (-) (black) cable. Coat terminals and bolt threads with Grease.

4. Reinstall the holder strap.

SEALED LOW MAINTENANCE BATTERY TESTING

Whenever a service complaint is related to either the starting or charging systems, the battery should be checked first.

ELECTRICAL

Following are three tests, which can easily be made on a battery to determine its condition: OCV Test, Specific Gravity Test and Load Test.

SEALED LOW MAINTENANCE BATTERY -- OCV – OPEN CIRCUIT VOLTAGE TEST

Battery voltage should be checked with a digital Multi-tester. Readings of 12.8 volts or less require further battery testing and charging. See charts and Load Test.

NOTE: Lead-acid batteries should be kept at or near a full charge as possible. If the battery is stored or used in a partially charged condition, or with low electrolyte levels, hard crystal sulfa ion will form on the plates, reducing the efficiency and service life of the battery.

NOTE: Use a voltmeter or multi-meter to test batter voltage.

OPEN CIRCUIT VOLTAGE		
State of charge	**Maintenance Free**	**Low Maintenance Type**
100%	13.0V	12.70V
75% Charged	12.80V	12.50V
50% Charged	12.50V	12.20V
25% Charged	12.20V	12.0V
0% Charged	Less than 12.0V	Less than 11.9V

* At 28℃

NOTE: Subtract .01 from the specific gravity reading at 0℃.

SEALED LOW MAINTENANCE BATTERY LOAD TEST

⚠ CAUTION
Whenever removing or reinstalling the battery, disconnect the negative (black) cable first and reinstall the negative cable last!

NOTE: This test can only be performed on machines with electric starters. This test cannot be performed with an engine or starting system that is not working properly.

A battery may indicate a full charge condition in the OCV test and the specific gravity test, but still may not have the storage capacity necessary to properly function in the electrical system. For this reason, a battery capacity or load test should be conducted whenever poor battery performance is encountered. To perform this test, hook a multi-tester to the battery in the same manner as was done in the OCV test. The reading should be 12.6 volts or greater. Engage the starter and observe the battery voltage while cranking the engine. Continue the test for 15 seconds. During cranking the observed voltage should not drop below 9.5 volts. If the beginning voltage is 12.6 volts or higher and the cranking voltage drops below 9.5 volts during the test, replace the battery.

SEALED LOW MAINTENANCE BATTERY OFF—SEASON STORAGE

To prevent battery damage during extended periods of non-use, the following basic battery maintenance items must be performed:

◎ Remove the battery from the machine and wash the case and battery tray with a mild solution of baking soda and water. Rinse with lots of fresh water after cleaning.

◎ Using a wire brush or knife, remove any corrosion from the cables and terminals.

◎ Charge at a rate no greater than 1/10 of the battery's amp/hr capacity until the voltage reaches 13.0VDC or greater.

◎ Store the battery either in the machine with the cables disconnected, or store in a cool place.

NOTE: Stored batteries lose their charge at the rate of up to 1% per day. Recharge to full capacity every 30 to 60 days during a non-use period. If the battery is stored during the winter months, electrolyte will freeze at higher temperatures as the battery discharges. The chart below indicates freezing points by specific gravity.

Electrolyte Freezing Points	
Specific Gravity of Electrolyte	**Freezing Point**
1.265	-80℃ (-75℉)
1.225	-37℃ (-35℉)
1.200	-27℃ (-17℉)
1.150	-15℃ (+5℉)
1.100	-8℃ (+18℉)
1.050	-3℃ (+27℉)

SEALED LOW MAINTENANCE BATTERY CHARGING PROCEDURE

1. Remove the battery from the ATV to prevent damage from leaking or spilled acid during charging.
2. Charge the battery with a variable rate charging output. Charge as needed to raise the voltage to 12.8VDC or greater.
3. Install battery in vehicle with positive terminal toward the front. Coat threads of battery bolt with a corrosion resistant Grease.
4. Route cables so they are tucked away in front and behind battery.
5. Connect battery cables.

⚠ WARNING

To avoid the possibility of sparks and explosion, connect positive (red) cable first and negative (black) cable last.

6. After connecting the battery cables, install the cover on the battery and attach the hold down strap.

CONVENTIONAL BATTERY ACTIVATION / SVC

To ensure maximum service life and performance from a battery, perform the following steps.

NOTE: This section contains information for both conventional Lead--Acid batteries and Sealed Low Maintenance batteries. Before service, identify the battery type in the vehicle. Use the section that applies to the battery.

⚠ WARNING

Battery electrolyte is poisonous. It contains sulfuric acid. Serious burns can result from contact with skin, eyes or clothing. Antidote:
External: Flush with water.
Internal: Drink large quantities of water or milk. Follow with milk of magnesia, beaten egg, or vegetable oil. Call physician immediately.
Eyes: Flush with water for 15 minutes and get prompt medical attention.
Batteries produce explosive gases. Keep sparks, flame, cigarettes, etc. away. Ventilate when charging or using in an enclosed space.
Always shield eyes when working near batteries.
KEEP OUT OF REACH OF CHILDREN.

⚠ WARNING

The gases given off by a battery are explosive. Any spark or open flame near a battery can cause an explosion, which will spray battery acid on anyone close to it. Should there be contact with battery acid, wash the affected area with large quantities of cool water and seek immediate medical attention.

NOTE: New Battery must be fully charged before use or battery life will be significantly reduced 10-30% of the battery's full potential.

To activate a new battery:

1. Remove vent plug from vent fitting. Remove cell caps.
2. Fill battery with electrolyte to upper level marks on case.
3. Set battery aside to allow for acid absorption and stabilization for 30 minutes.
4. Add electrolyte to bring level back to upper level mark on case.

NOTE: This is the last time that electrolyte should be added. If the level becomes low after this point, add only distilled water.

5. Charge battery at 1/10 of its amp/hour rating.

Examples: 1/10 of 9 amp battery = .9 amp; 1/10 of 14 amp battery = 1.4 amp; 1/10 of 18 amp battery = 1.8 amp (recommended charging rates).

6. Check specific gravity of each cell with a hydrometer to assure each has a reading of 1.270 or higher.

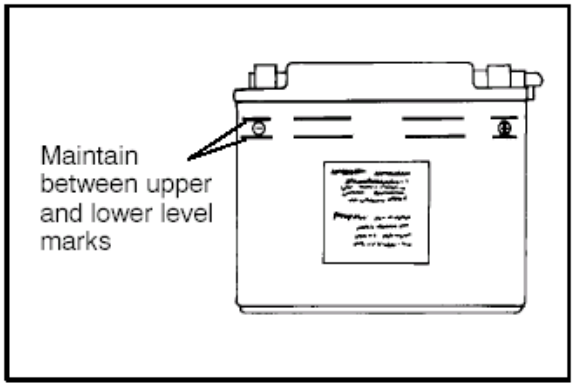
BATTERY TERMINALS / TERMINAL BOLTS

Use corrosion resistant grease on battery bolts. See Battery Installation.

CONVENTIONAL BATTERY INSPECTION / REMOVAL

The battery is located under the seat and the right rear fender see **page 9.20**.

Inspect the battery fluid level. When the battery fluid nears the lower level, remove the battery and fill with *distilled water only* to the upper level line. To remove the battery:



1. Disconnect holder strap and remove covers.

2. Disconnect battery negative (-) (black) cable first, followed by the positive (+) (red) cable.

⚠ CAUTION

Whenever removing or reinstalling the battery, disconnect the negative (black) cable first and reinstall the negative cable last!

3. Remove the battery.

4. Remove the filler caps and add ***distilled water only*** as needed to bring each cell to the proper level. Do not overfill the battery.

⚠ CAUTION

Refill using only distilled water. Tap water contains minerals that are harmful to a battery.

⚠ CAUTION

Do not allow cleaning solution or tap water inside the battery. Battery life may be reduced.

5. Reinstall the battery caps.

CONVENTIONAL BATTERY INSTALLATION

1. Clean battery cables and terminals with a stiff wire brush. Corrosion can be removed using a solution of one-cup water and one tablespoon baking soda.

Rinse well with clean water and dry thoroughly.

2. Route the cables correctly.

3. Reinstall battery, attaching positive (+) (red) cable first and then the negative (-) (black) cable. Coat terminals and bolt threads with Grease.

4. Install clear battery vent tube from vehicle to battery vent.

⚠ WARNING

Vent tube must be free from obstructions and kinks and securely installed. If not, battery gases could accumulate and cause an explosion. The vent tube should be routed away from frame and body to prevent contact with electrolyte. Avoid skin contact with electrolyte, as severe burns could result. If electrolyte contacts the vehicle frame, corrosion will occur.

5. Reinstall the holder strap.

CONVENTIONAL BATTERY TESTING

Whenever a service complaint is related to either the starting or charging systems, the battery should be checked first. Following are three tests which can easily be made on a battery to determine its condition: OCV Test, Specific Gravity Test and Load Test.

CONVENTIONAL BATTERY OCV - OPEN CIRCUIT VOLTAGE TEST

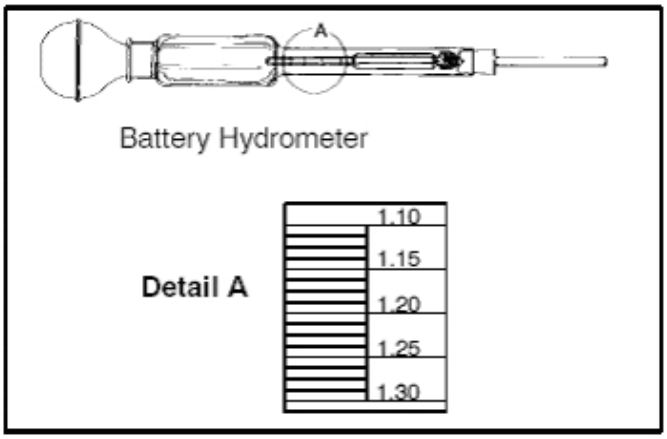
Battery voltage should be checked with a digital Multi-tester. Readings of 12.6 volts or less require further battery testing and charging. See charts and Load Test on below.

NOTE: Lead-acid batteries should be kept at or near a full charge as possible. Electrolyte level should be kept between the low and full marks. If the battery is stored or used in a partially charged condition, or with low electrolyte levels, hard crystal sulfating will form on the plates, reducing the efficiency and service life of the battery.

CONVENTIONAL BATTERY SPECIFIC GRAVITY TEST

A tool such as a Battery Hydrometer can be used to measure electrolyte strength or specific gravity. As the battery goes through the charge/discharge cycle, the electrolyte goes from a heavy (more acidic) state at full charge to a light (more water) state when discharged. The hydrometer can measure state of charge and differences between cells in a multi-cell battery. Readings of 1.270 or greater should be observed in a fully charged battery.

Differences of more than .025 between the lowest and highest cell readings indicate a need to replace the battery.



OPEN CIRCUIT VOLTAGE		
State of charge	**Conventional Lead-acid**	**Low Maintenance Type**
100%	12.60V	12.70V
75% Charged	12.40V	12.50V
50% Charged	12.10V	12.20V
25% Charged	11.8V	12.0V
0% Charged	Less than	Less than 11.9V
SPECIFIC GRAVITY		
State of charge*	**Conventional lead-acid**	**Low Maintenance Type**
100%	1.265	1.275
75% Charged	1.210	1.225
50% Charged	1.160	1.175
25% Charged	1.120	1.135
0% Charged	Less than 1.100	Less than 1.115

* At 28℃

NOTE: Subtract .01 from the specific gravity reading at 0℃.

CONVENTIONAL BATTERY LOAD TEST

⚠ CAUTION

To prevent shock or component damage, remove spark plug high-tension leads and connect securely to engine ground before proceeding.

NOTE: This test can only be performed on machines with electric starters. This test cannot be performed with an engine or starting system that is not working properly. A battery may indicate a full charge condition in the OCV test and the specific gravity test, but still may not have the storage capacity necessary to properly function in the electrical system. For this reason, a battery capacity or load test should be conducted whenever poor battery performance is encountered. To perform this test, hook a multi-tester to the battery in the same manner as was done in the OCV test. The reading should be 12.6 volts or greater. Engage the starter and observe the battery voltage while cranking the engine. Continue the test for
15 seconds. During cranking the observed voltage should not drop below 9.5 volts. If the beginning voltage is 12.6 volts or higher and the cranking voltage drops below 9.5 volts during the test, replace the battery.

ELECTRICAL

CONVENTIONAL BATTERY OFF SEASON STORAGE

To prevent battery damage during extended periods of non-use, the following basic battery maintenance items must be performed:

◎ Remove the battery from the machine and wash the case and battery tray with a mild solution of baking soda and water. Rinse with lots of fresh water after cleaning. **NOTE: Do not get any of the baking soda into the battery or the acid will be neutralized.**

◎ Using a wire brush or knife, remove any corrosion from the cables and terminals.

◎ Make sure that the electrolyte is at the proper level. Add distilled water if necessary.

◎ Charge at a rate no greater than 1/10 of the battery's amp/hr capacity until the electrolyte's specific gravity reaches 1.270 or greater.

◎ Store the battery either in the machine with the cables disconnected, or store in a cool place.

NOTE: Stored batteries lose their charge at the rate of 1% per day. Recharge to full capacity every 30 to 60 days during a non-use period. If the battery is stored during the winter months, electrolyte will freeze at higher temperatures as the battery discharges. The chart below indicates freezing points by specific gravity.

Electrolyte Freezing Points	
Specific Gravity of Electrolyte	**Freezing Point**
1.265	-80℃ (-75℉)
1.225	-37℃ (-35℉)
1.200	-27℃ (-17℉)
1.150	-15℃ (+5℉)
1.100	-8℃ (+18℉)
1.050	-3℃ (+27℉)

CONVENTIONAL BATTERY CHARGING PROCEDURE

1. Remove the battery from the ATV to prevent damage from leaking or spilled acid during charging.

2. Charge the battery with a charging output no larger than 1/10 of the battery's amp/hr rating. Charge as needed to raise the specific gravity to 1.270 or greater.

3. Install battery in vehicle with positive terminal toward the front. Coat threads of battery bolt with a corrosion resistant dielectric grease.

4. Connect battery cables.

⚠ WARNING

To avoid the possibility of explosion, connect positive (red) cable first and negative (black) cable last.

5. After connecting the battery cables, install the cover on the battery and attach the hold down strap.

6. Install clear battery vent tube from vehicle to battery vent.

⚠ WARNING

Vent tube must be free from obstructions and kinks and securely installed. If not, battery gases could accumulate and cause an explosion. Vent should be routed away from frame and body to prevent contact with electrolyte. Avoid skin contact with electrolyte, as severe burns could result. If electrolyte contacts the vehicle frame, corrosion will occur.

7. Route cables so they are tucked away in front and behind battery.

8. Reinstall battery, attaching positive (+) (red) cable first and then the negative (-) (black) cable. Coat terminals and bolt threads with Dielectric Grease.

9. *(Conventional Lead/Acid Batteries Only)* Install clear battery vent tube from vehicle to battery vent.

⚠ WARNING

Vent tube must be free from obstructions and kinks and securely installed. If not, battery gases could accumulate and cause an explosion. Vent should be routed away from frame and body to prevent contact with electrolyte. To avoid skin contact with battery electrolyte, severe burns could result. If electrolyte contacts the vehicle frame, corrosion will occur.

10. Route cables so they are tucked away in front and behind battery.

11. Reinstall battery cover and holder strap.

⚠ CAUTION

Do not run the engine with the battery disconnected. Electrical components can become damaged.

IF THE HEADLIGHT AND TAILLIGHT FAIL TO COME ON, FOLLOWING PROCEDURE TO CHECKING.

◎ **Fuse**

Check the fuse (main, light system) continuity. If broken, replace the fuse.

◎ **Battery**

Check the battery condition. The open-circuit voltage should be 12.8 V or more at 20 °C (68 °F).

◎ **Main Switch**

Refer to “KEY/MAIN SWITCH” at above. If main switch isn’t continuity, replace the main switch.

◎ **Wire connection**

Refer to “CIRCUIT DIAGRAM” to check properly connect the light system. If light wires are poor continuity, repair the wires.

◎ **Light Switch**

Refer to “ SWITCH SERVICE” to check properly connect the light switch. If light switch is poor continuity, replace the switch.

HEADLIGHT

1. Connect the multi-meter (DC 20 V) probe into the headlight connector.

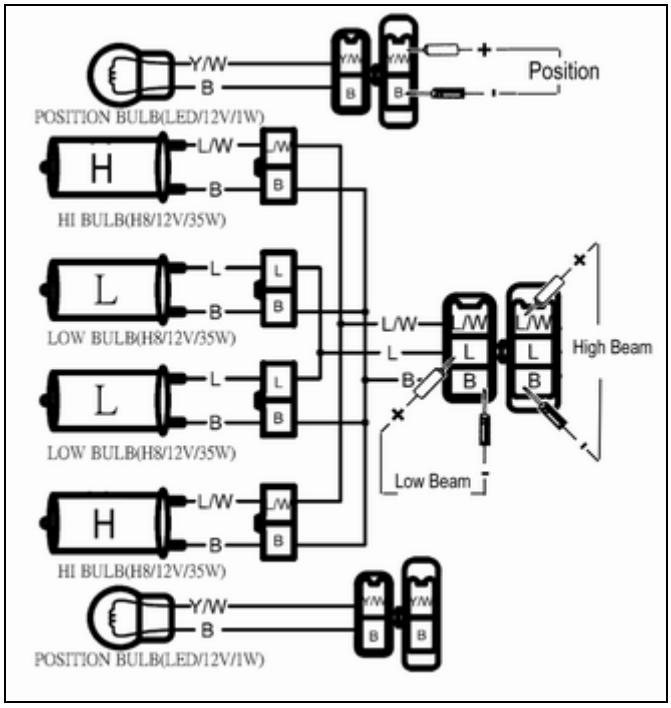
2. Turn the main switch” on” and beam switch on” ”. Connect probe (+) into ”L” terminal and probe (-) into “B” terminal. Both position and low beam bulb should come on.

3. Check the voltage (12 V) of the “W/L” and “B” terminals on the bulb socket connector.

4. Turn the main switch” on” and beam switch on” ”. Connect probe (+) into ”L/W” terminal and probe (-) into “B” terminal. Both position and high beam bulb should come on.

5. Check the voltage (12 V) of the “L” and “B” terminals on the bulb socket connector.

6. Turn the main switch” on” anyone beam switch. Connect probe (+) into “Y/W” terminal and probe (-) into “B” terminal. Both position and anyone beam bulb should come on.

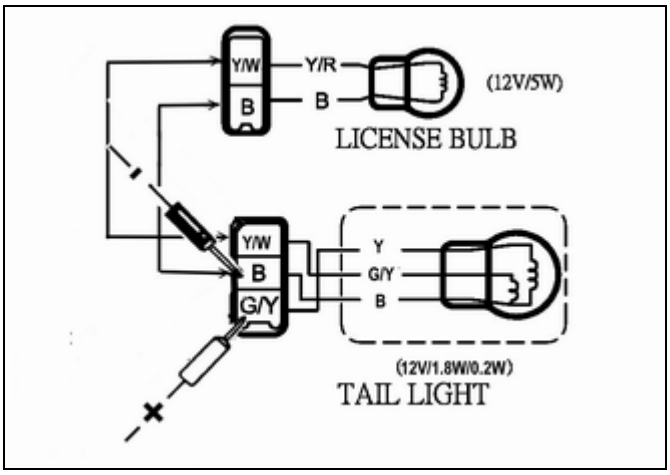


7. If the wiring circuit from the main switch to the bulb socket connector is faulty, repair or replace it.

TAILLIGHT AND LICENSE LAMP

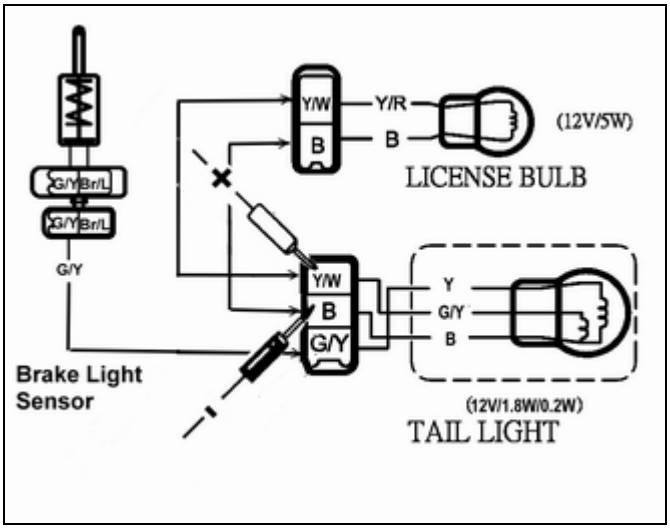
1. Connect the multi-meter (DC 20 V) probe into the headlight connector.

2. Turn the main switch” on” and connect probe (+) into ”G/Y” terminal and probe (-) into “B” terminal.



3. Check the voltage (12 V) of the “Y” and “B” terminals on the taillight and license bulb socket connector.

4. Turn the main switch" on" and apply brake lever. Connect probe (+) into "Y/W" and probe (-) into "B".



5. Check the voltage (12 V) of the "G/Y" and "B" terminals on the taillight bulb socket and foot brake pedal sensor connector.
6. If the wiring circuit from the main switch to the bulb socket connector is faulty, repair it.

COOLING SYSTEM

IF THE FAN MOTOR DOES NOT TURNING, FOLLOWING PROCEDURE TO CHECKING.

◎ Fuse

Check the fuse (main) continuity. If broken, replace the fuse.

◎ Battery

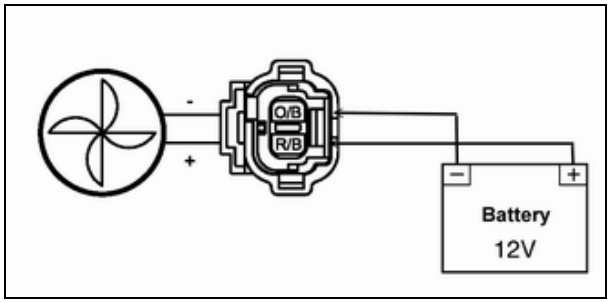
Check the battery condition. The open-circuit voltage should be 12.8 V or more at 20 °C (68 °F).

◎ Main Switch

Refer to "KEY/MAIN SWITCH" at above. If main switch isn't continuity, replace the main switch.

◎ RADIATOR FAN MOTOR

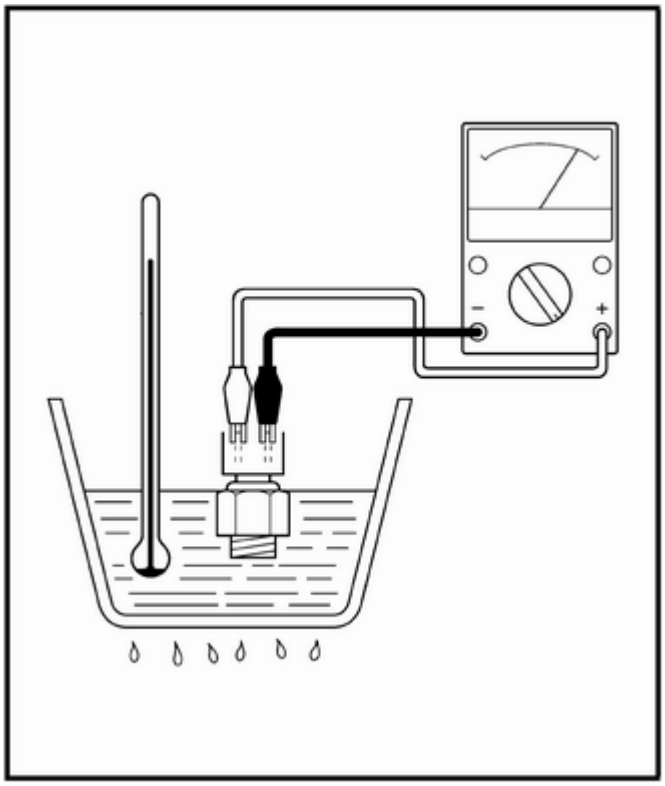
1. Disconnect the radiator fan motor coupler.
2. Connect the battery (12 V) as shown.



3. Check the operation of the radiator fan motor. If the fan does not run, replace it.

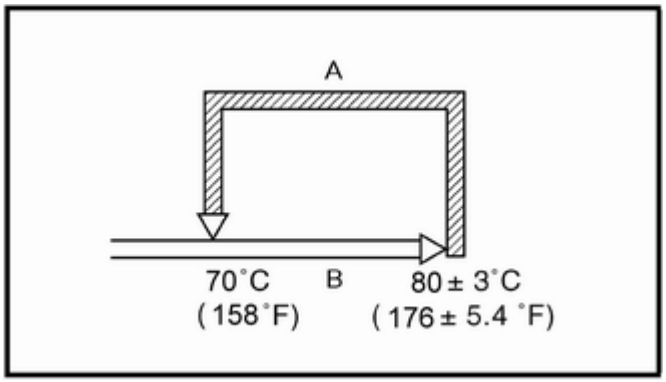
◎ THERMO SWITCH

1. Remove the thermo switch 3 from the radiator.
2. Connect the multi-meter (Ωx・1) to the thermo switch.
3. Immerse the thermo switch into hot water.



4. Check the thermo switch for continuity.

While heating the coolant use a thermometer to record the temperatures.



Note:

A, The thermo switch circuit is closed.

B. The thermo switch circuit is open.

Step: Heating

Water temperature	Continuity
Less than 80 ± 3 °C (176 ± 5.4 °F)	No
More than 80 ± 3 °C (176 ± 5.4 °F)	Yes

Step: Cooling

Water temperature	Continuity
More than 70 °C (154.4 °F)	Yes
Less than 67 °C (153 °F)	No

⚠ WARNING

Handle the thermo switch with special care. Hot water could severe injury skin and eyes. Always wearing protection gears.

⚠ CAUTION

Never subject it to a strong shock or allow it to be dropped. Should it be dropped, it must be replaced.

5. If the thermo switch does not continuity, replace it.

◎ Wiring connection

Refer to "CIRCUIT DIAGRAM". Check the connections of the entire cooling system. If poor connecting, repair or replace it.

Trouble Shooting

No voltage

- Battery discharged.
- The cable disconnected.
- The fuse is blown.
- Improper operation of the main switch.
- Low voltage.
- The battery is not fully charged.
- Poor contact.
- Poor charging system.
- Poor voltage regulator.

No spark produced by spark plug

- The spark plug is out of work.
- The cable is poorly connected, open or short-circuited.
- Between AC Generator ECU.
- Poor connection between ECU and ignition coil.
- Poor connection between ECU and the main switch.
- Bad main switch.
- ECU malfunctions.
- AC Generator malfunctions.

Starter motor does not work

- The fuse is blown.
- The battery is not fully charged.
- Bad main switch.
- Bad starter switch.
- The front or rear brake switches does not function correctly.
- Starter relay is out of work.
- The ignition coil is poorly connected, open or short-circuited.
- The starter motor malfunctions.

ELECTRICAL

Intermittent power supply

- The connector of the charging system becomes loose.
- Poor connection of the battery cable.
- Poor connection or short-circuit of the discharging system.
- Poor connection or short-circuit of the power generation system.

Charging system does not operate properly

- Burnt fuse.
- Poor contact, open or short circuit.
- Regulator/Rectifier malfunctions
- AC Generator malfunctions

Engine does not crank smoothly

- Primary winding circuit.
- Poor ignition coil.
- Poor connection of cable and connectors.
- Poor main switch.
- Secondary winding circuit.
- Poor ignition coil.
- Poor spark plug.
- Poor ignition coil cable.
- Current leakage in the spark plug.
- Incorrect ignition timing.
- AC Generator malfunctions.
- Improper installation of CPS.
- ECU malfunctions.

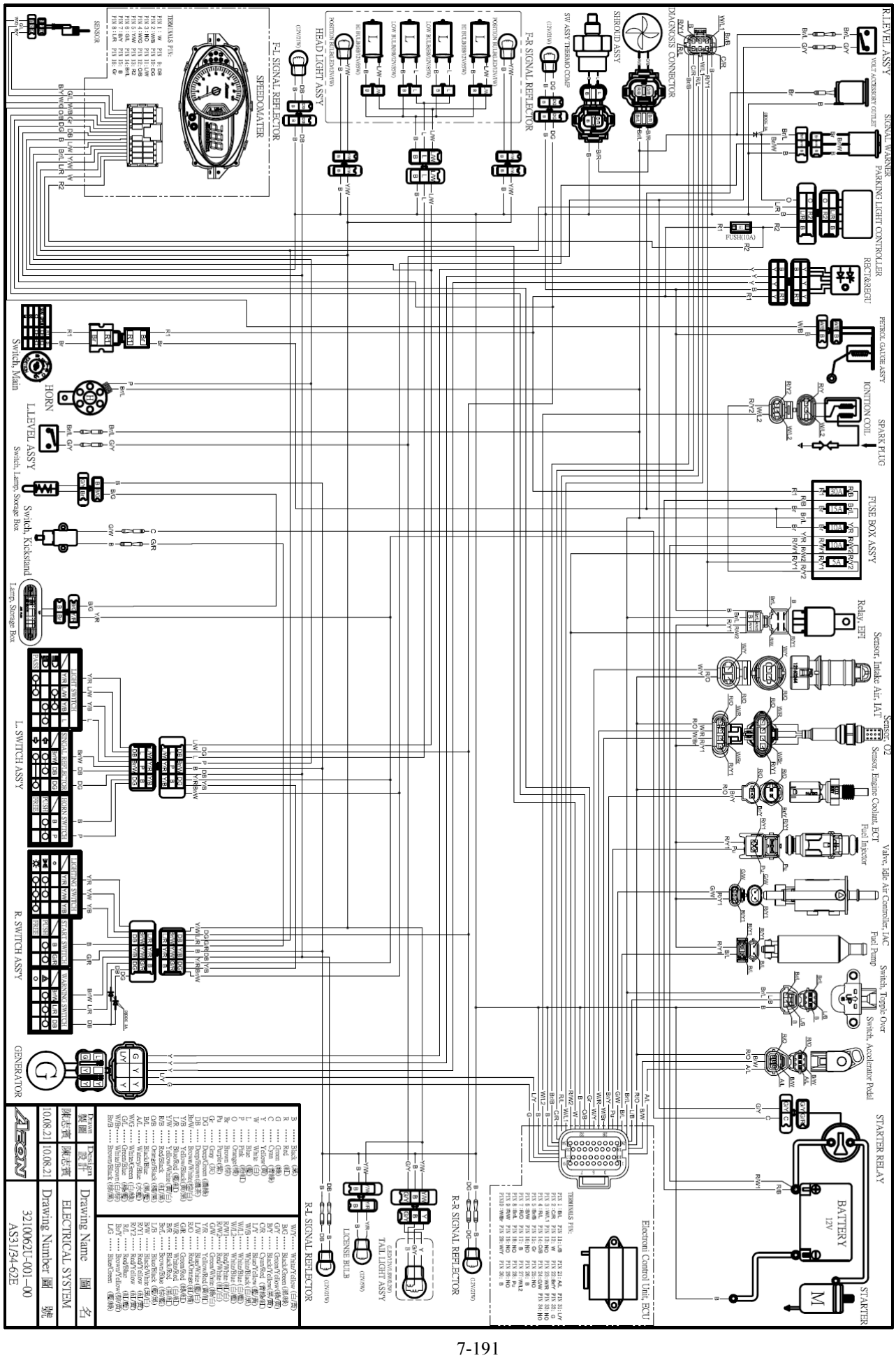
Weak starter motor

- Poor charging system.
- The battery is not fully charged
- Poor connection in the windings
- The motor gear is jammed by foreign material

Starter motor is working, but engine does not crank

- Poor starter motor pinion.
- The starter motor runs in reverse direction.
- Poor battery.

ELECTRICAL


R.LEVEL ASSY
SIGNAL WARNER
PARKING LIGHT CONTROLLER
RECT&REGU
DIAGNOSIS CONNECTOR
SHROUD ASSY
SW ASSY THERMO COMP
F-R SIGNAL REFLECTOR
HEAD LIGHT ASSY
F-L SIGNAL REFLECTOR
SPEEDOMATER
SENSOR
PETROL GAUGE ASSY
IGNITION COIL
SPARK PLUG
FUSE BOX ASSY
Relay, EHT
Sensor, Intake Air, IAT
Sensor, O2
Sensor, Engine Coolant, ECT
Fuel Injector
Valve, Idle Air Controller, IAC
Fuel Pump
Switch, Topple Over
Switch, Accelerator Pedal
STARTER RELAY
STARTER
BATTERY
12V
Electronic Control Unit, ECU
Switch, Main
HORN
L.LEVEL ASSY
Switch, Lamp, Storage Box
Switch, Kickstand
Lamp, Storage Box
L. SWITCH ASSY
R. SWITCH ASSY
GENERATOR
R-L SIGNAL REFLECTOR
R-R SIGNAL REFLECTOR
TAIL LIGHT ASSY
LICENSE BULB
Drawing Name 圖名
ELECTRICAL SYSTEM
Drawing Number 圖號
3210062U-001-00
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ELECTRICAL